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DEPARTMENT OF HEALTH
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CANCER OF THE LUNG IN NEW ZEALAND

Issued by the National Health Statistics Centre
of the
Department of Health, Wellington

1973

New Zealand.

DEPARTMENT OF HEALTH

CANCER OF THE LUNG IN NEW ZEALAND

A review of the trends in Deaths Registered and Cases Reported to the National Cancer Registry, together with an examination of the possible effects of urbanisation. Patterns in diagnosis and survival of 2,848 Cases Treated during 1957-65 in the Thoracic Units of the four main centre hospitals are discussed. A high risk group, The Maori, is identified. Recommendations are made for the introduction of periodic Surveys of the Smoking Habits of the New Zealand Adult Population.

by

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FOREWORD

As recently as forty years ago, bronchogenic carcinoma was a condition which doctors rarely came across. Today, except for malignancy of the skin, it is the most common cancer seen in men in New Zealand and the numbers are increasing ominously in women. By reason of its exceedingly lethal nature, it ranks today as by far the most common cause of cancer death in men. This phenomenal increase is in striking contrast to the experience in other types of cancer which have shown little change over a long period of years.

This epidemic proportion increase has aroused the concern of the government health agencies of all countries, while on the international scene, the World Health Organization views this disease as one of its major concerns and has intensified its programmes to discourage the cigarette smoking habit. In 1971, a World Conference on Smoking and Health was held, attended by four hundred and twenty-seven delegates from 25 countries, including New Zealand.

Throughout the world, truly massive research resources are given over to the identification of agents which cause cancer in different organs of the body. Lung cancer is the one site in which the cause is known yet this knowledge has had little impact, so sure is the average cigarette smoker that he will not be affected by lung cancer or by bronchitis, emphysema or the premature onset of heart disease. In respect of lung cancer, currently over eight hundred New Zealand smokers each year pay for their misconception with their lives.

This report, like a host of others, contains irrefutable evidence indicting the cigarette as the prime cause of lung cancer. A special feature is that it combines the measures of increase in the national figures of death and case registration with an analysis in depth of the medical features of a large sample of the cases which have contributed to the national figures. This report covering the New Zealand experience is certain to arouse a great deal of interest overseas, while the medical analysis will prove of value to physicians and surgeons in their decisions as to the treatment of patients. Health educators and epidemiologists should also find it a handy source of reference.

Clearly, a great deal of work has gone into the preparation of this contribution by New Zealand to the study of one of the world's prime public health problems. I commend the enterprise of the authors, both surgeons and statisticians, with special thanks due to the doctors of the four Thoracic Units in the main centres who so diligently recorded the details of their patients between 1957 and 1965.

H.J.H. Hiddlestone
Director-General of Health

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The contents of this publication are the personal opinion of the authors and do not necessarily reflect the views of the Department of Health

PART A : DEATHS AND CASES REGISTERED

Introduction

This section examines the lung cancer figures of death and case registration. These data have been obtained from published reports and from statements supplied by the National Health Statistics Centre of the New Zealand Department of Health. The full tables, each of which has been summarised in this section, are contained in Appendix A of this report. These are as follows:

Section 1 : Deaths - Tables

Table 1 Numbers and rates, 1926-71

Table 2 Numbers at ages, 1926-71

Table 3 Rates at ages, 1934-71

Section 2 : Cases registered - Tables

Table 4 New cases in numbers at ages, 1948-70

Table 5 New cases in rates at ages, 1948-70

Section 3 : The incidence in the Maori - Tables

Table 6 Deaths in numbers at ages, 1949-71

Table 7 Deaths in rates at ages, 1949-71

Table 8 New cases registered in numbers at ages, 1953-70

Table 9 New cases registered in rates at ages, 1953-70

Table 10 Estimated incidence in numbers at ages, 1966-70

SECTION 1 : DEATHS - COMMENT

1.1 Trends in deaths - total numbers and total rates examined

In the course of the last forty years, cancer of the lung and bronchus has changed from a condition rarely diagnosed to become a major health problem. A comprehensive aggregation of scientific and medical facts points to this increase, of epidemic proportions, being due almost in its entirety to the smoking of cigarettes. The following table extracted from Table 1 summarises the position from 1926 until the latest year for which figures were available:

TOTAL NUMBERS OF DEATHS FROM LUNG CANCER AND TOTAL RATES

Year	MALES			FEMALES		
	Number of deaths	Crude death rate per 100,000 of population	Standardised mortality ratio (Base years 1950-52=100)	Number of deaths	Crude death rate per 100,000 of population	Standardised mortality ratio (Base years 1950-52=100)
1926	9	1.3	7	10	1.5	45
1936	36	4.5	23	18	2.3	72
1946	128	14.5	65	20	2.3	62
1956	314	28.6	140	59	5.4	140
1966	536	39.8	210	73	5.5	150
1967	509	37.2	192	93	6.8	184
1968	627	45.5	232	102	7.4	198
1969	644	46.3	236	117	8.4	221
1970	680	48.5	248	149	10.6	278
1971	678	47.4	240	135	9.4	247

Note: The standardised mortality ratio is an index number (1950-52 = 100) which allows for changes in population age-structure over periods of time

Forty-five years ago, cancers affecting the lung and bronchus were a minute part of the total cancer death total with males and females fairly equally represented. By 1971, the condition contributed twenty-eight percent to the yearly total of cancer deaths in men and seven percent to the cancer total in women. The explosive increase in lung cancer is unique. In cancers of other sites, there has been little change in the rate of dying over the same period. In many sites, there has been some decline in mortality. Everything points to an environmental influence being implicated in the lung cancer increase with the cigarette the dominant aetiological factor.

The question arises as to whether the increase is likely to continue or is the situation likely to stabilise, or even improve? For guidance in answering this question, we need to turn to the movement in age-adjusted rates. For an examination of the long-term trend in age-adjusted lung and bronchus death rates (over the last forty years) it is necessary to adopt rates published in the 1955 Department of Health report CANCER MORBIDITY AND MORTALITY IN NEW ZEALAND. These rates were for the European population only and were age-adjusted to the population of England and Wales, 1901. For the years subsequent to 1955, the rates have been calculated in the same way.

THE LONG-TERM TREND IN AGE-ADJUSTED LUNG CANCER DEATH RATES, 1929-71

Period	AGE-ADJUSTED DEATH RATES PER 100,000 OF POPULATION		
	Males	Females	Male/Female ratio
1929-31	2.77	1.16	2.4 : 1
1939-41	4.31	1.50	2.9 : 1
1949-51	12.77	2.00	6.4 : 1
1959-61	21.41	3.48	6.2 : 1
1969-71	34.31	6.50	5.3 : 1

Age-adjusted to the population of England and Wales 1901

Adjustment to the population structure of a year so far in the past produces very low and unrealistic figures for years close to the present. For all that, the differences between the rates are a true measure of the degree of change over this period of time.

The percentage changes in the European age-adjusted rates at each ten-year interval were as follows:

	Males	Females
	%	%
Between 1929-31 and 1939-41	+ 56	+30
Between 1939-41 and 1949-51	+196	+33
Between 1949-51 and 1959-61	+ 68	+74
Between 1959-61 and 1969-71	+ 60	+87

Male rates rose steeply in the nineteen-forties. The following two decades saw a slackening in the pace of increase. As yet there is no indication that the upward trend will slow right down to the point where a levelling-off stage can be looked for. Female rates took their abrupt upward turn ten years later, in the nineteen-fifties and the upward movement in the rate of increase between decades has continued to rise and is likely to continue to rise.

For the reason that the rise in female death rates is the steeper and likely to remain steeper, the male/female ratio which has started to decline should continue to decline.

The short-term trend in age-adjusted rates is presented in the table which follows. In this table, the rates for years prior to 1971 have been adjusted to the total New Zealand mean population of the latest year 1971. To produce a more sensitive figure, the calculation has been confined to those ages at which almost all lung cancer occurs, that is, upward of 25 years. Maoris are included in the rates for the total population at these ages.

THE SHORT-TERM TREND IN AGE-ADJUSTED LUNG CANCER DEATH RATES
AGE-ADJUSTED DEATH RATES PER 100,000 OF POPULATION
AGED 25 AND OVER, 1960-71

Period	Males	Females	Male/Female ratio
1960	56.4	10.1	5.6 : 1
1961	64.7	12.1	5.3 : 1
1962	70.5	9.6	7.3 : 1
1963	73.2	12.2	6.0 : 1
1964	73.9	12.2	6.1 : 1
1965	74.7	10.1	7.4 : 1
1966	81.3	10.7	7.6 : 1
1967	75.8	13.3	5.7 : 1
1968	91.4	14.4	6.3 : 1
1969	93.1	16.2	5.7 : 1
1970	97.0	20.4	4.8 : 1
1971	95.3	18.1	5.3 : 1

Age-adjusted to the mean total population of New Zealand, ages 25 and over, 1971

The yearly rates listed above are presented in graph form in Figure 1 which follows. The semi-log arithmetic scale has been adopted. On this scale, a constant percentage increase would show as an upward inclined straight line and any other increase as an upward curving line. No increase or levelling off would appear as a horizontal straight line and a decrease as a downward turning line. The points plotted on the semi-log scale are those of a three-year moving average - a simple arithmetic device to smooth out the fluctuations which occur in the compara ively small annual totals of deaths recorded in New Zealand.

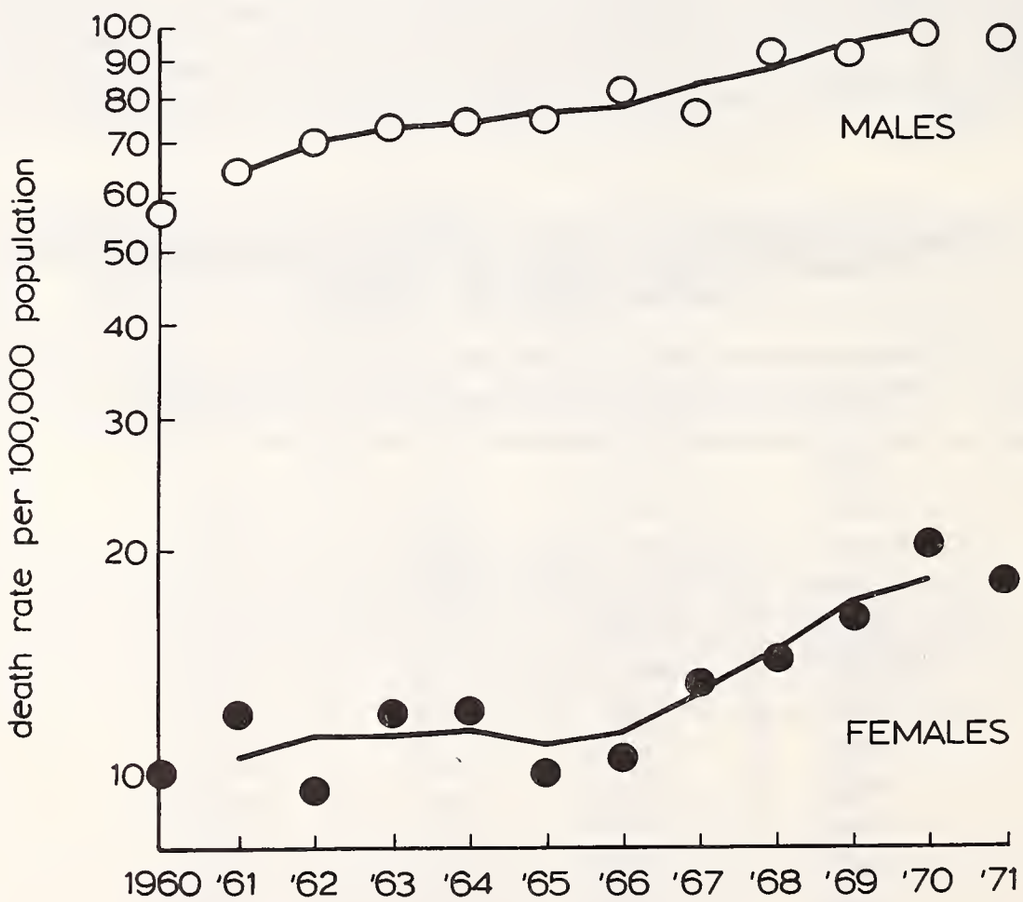
An interpretation of the trend line in <u>males</u> is difficult and largely a matter of decision. However, it does appear that the increase is still close to the constant.

The <u>female</u> rate seems to be on the way up and accelerating over very recent years. The fluctuations in the rate for this sex between 1961 and 1966 make it difficult to arrive at a very positive conclusion although there are logical reasons in the known increase in smoking among women to expect that an increase would occur.

FIGURE 1

Death rate per 100,000 of population, aged 25 years and over, male and female

Age-adjusted to mean population, 1971
Trend lines based on three year moving averages of rates



1.2 Trends in deaths - age group death rates examined

The previous sub-section has examined the trends in rates covering all ages at death. This sub-section examines the movement in the rates at specific ages.

Table 3 in Appendix A compares the lung and bronchus death rates by age groupings at five year intervals from 1934 to 1971. The changes in the rates over the last 20 years in one ten-year interval and in one eight year interval (1972 and 1973 rates are not yet available) were as follows:

THE LONG-TERM TREND IN AGE GROUP DEATH RATES, 1949-71

Age group	Death rates per 100,000			Percentage change	
	Average 1949-53	Average 1959-63	Average 1969-71	Between 1949-53 and 1959-63 (10 year interval)	Between 1959-63 and 1969-71 (8 year interval)
	MALES				
35 - 39	3.2	3.7	3.9	+ 15.6	+ 5.4
40 - 44	7.1	8.1	15.7	+ 14.1	+ 93.8
45 - 49	26.1	29.2	35.6	+ 11.9	+ 21.9
50 - 54	42.2	44.5	65.9	+ 5.5	+ 48.1
55 - 59	85.3	94.7	120.9	+ 11.0	+ 27.7
60 - 64	89.2	175.6	228.4	+ 96.9	+ 30.1
65 - 69	124.5	238.9	377.5	+ 91.9	+ 58.0
70 - 74	120.9	236.8	398.8	+ 95.9	+ 68.4
75+	91.0	235.4	381.1	+ 158.7	+ 61.9
	FEMALES				
35 - 39	0.9	1.5	4.0	+ 66.7	+ 166.7
40 - 44	2.2	2.2	6.4	Nil	+ 190.9
45 - 49	2.6	6.8	6.4	+ 161.5	- 6.2
50 - 54	6.6	9.4	18.3	+ 42.4	+ 94.7
55 - 59	13.0	14.0	36.3	+ 7.7	+ 159.3
60 - 64	10.4	21.5	40.3	+ 106.7	+ 87.4
65 - 69	14.9	26.4	40.9	+ 77.2	+ 54.9
70 - 74	18.6	34.4	46.1	+ 84.9	+ 34.0
75+	23.7	31.4	44.5	+ 32.5	+ 41.7

It is at the earlier or comparatively younger ages of under 60 years that the increase in lung cancer mortality over the last twenty years has been proportionately higher. This experience is common to both sexes.

There is a logical correlation between this finding and the rise in consumption of tobacco in that it takes an average of twenty-five years of smoking to produce a lung cancer. The average annual consumption of tobacco per head of population in New Zealand (man, woman and child) rose from around three pounds per head in the early 'thirties' to around four pounds per head in the early 'forties' and to around five and one-quarter pounds per head in the early 'fifties'. The consumption per head has, it would appear, levelled off at this last figure.

The trend over the last twelve years in age group death rates was as follows in selected age groups:

THE RECENT TREND IN AGE GROUP DEATH RATES, 1960-71

Rates per 100,000 of population at ages

Year	35 - 44 years		45 - 54 years		55 - 64 years		65 - 74 years		75 years and over	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
1960	3	4	36	5	103	15	217	32	197	28
1961	4	3	38	8	139	22	217	31	228	36
1962	8	-	32	10	132	15	280	25	248	28
1963	8	2	41	10	147	21	242	35	302	27
1964	9	1	49	9	144	21	255	42	256	25
1965	14	1	32	11	136	17	289	24	280	26
1966	6	3	46	11	161	14	302	33	287	24
1967	4	4	41	13	143	20	267	35	338	33
1968	11	3	51	11	170	23	316	44	390	36
1969	9	5	55	12	173	36	336	36	371	34
1970	11	3	48	14	171	41	375	48	396	58
1971	10	7	48	11	169	37	370	46	380	42

Persistent increases in mortality have been recorded at all ages over this twelve-year recent period. The most rapid upward movement has been at ages 55-64 among females. There are some indications that the male rates at all ages may be beginning to stabilise.

1.3 Trends in deaths - cohort or generation death rates examined

Another way of examining changes in the rates of dying over periods of time is through year of birth cohorts. The method is to allot the deaths which have occurred over a long period of time (in this case between 1921 and 1970) to selected periods of birth. In this way the death experience of successive generations can be compared. The following table covers a total of over 9,000 male lung cancer deaths and is confined to the European population, that is - Maoris have been excluded.

COHORT DEATH RATES - MALES

per 100,000 of population at ages

Cohort	Dying at the age of:											
	35-	40-	45-	50-	55-	60-	65-	70-	75-	80-	85-	90+
Born in period												
1869-73	-	-	-	1.2	5.3	14.5	27.0	38.6	56.9	88.5	111.5	372.8
1874-78	-	-	2.5	3.6	13.5	32.7	55.1	81.3	125.2	169.9	242.4	188.7
1879-83	-	1.6	3.4	9.6	16.1	52.2	88.1	136.1	228.7	251.4	268.2	
1884-88	1.2	1.6	6.2	12.7	32.7	73.2	133.1	206.1	268.3	326.1		
1889-93	1.7	2.7	5.9	19.4	48.5	113.3	199.4	263.9	401.4			
1894-98	0.9	4.3	10.4	32.9	92.0	154.5	242.1	379.5				
1899-1903	1.5	6.0	18.9	40.9	84.7	180.2	282.1					
1904-08	2.7	7.4	25.0	48.3	103.1	219.7						
1909-13	3.1	9.1	26.9	50.0	114.7							
1914-18	2.7	9.7	29.7	67.4								
1919-23	1.4	10.1	29.8									
1924-28	7.0	11.4										

A very clear-cut picture emerges showing that in accordance with the spread of the cigarette smoking habit in successive generations, there has been practically without exception, a concomitant rise at all ages in the risk of dying from lung cancer. Those of the 1919-23 generation who have died from lung cancer show rates very close to those of the immediately preceding generation, those born 1914-18 who died at the same ages. The movement in the death rates of the 1919-23 generation who die at ages over 50 will be awaited with interest in view of the possibility that the spread of the knowledge that the cigarette smoking is injurious could have motivated sufficient numbers of middle-aged men to give up.

The number of female deaths from lung cancer has now increased to a size where a cohort analysis becomes possible for those born from as far back as the early nineteen-hundreds.

1.4 Trends in deaths - the future outlook

The movement in the death figures available seems to indicate that the incidence of lung cancer in men is likely to rise still higher and that the most that could be hoped for on the present happenings would be a slightly slower rate of increase. Only a sudden dramatic change in present smoking behaviour or the discovery and widespread acceptance of a cigarette without or with less cancer-causing tar could alter this forecast. Figures of trends in the extent of cigarette smoking among adults are scanty and even when produced, generally unreliable in this country, but survey-produced United States figures published in the Surgeon's-General Report of 1971 showed that the percentages of men "currently smoking cigarettes" graphed by age by year of birth cohorts had fallen substantially. There is reason to believe from small surveys taken out in New Zealand backed by observation that a reduction, perhaps of lesser magnitude, in the percentages of men smoking cigarettes at middle and older ages may also have occurred in New Zealand. Sir Richard Doll and Sir Austin Bradford Hill in their follow up study of British doctors showed that a decline in cigarette smoking is follwed by a decline in death rates[1]. Accordingly a slowing down in the rate of increase of lung cancer mortality among New Zealand men and later perhaps even some stabilisation with an eventual decline may be looked for.

The outlook for women is accepted internationally as being not at all favourable. More women proportionately will develop lung cancer and more will die from it. Whether the rates for women will ever reach the present level in men is problematical, but unlikely. The wide gap between men's and women's rates in the past is explained by a very much lower exposure to cigarettes, but for some time, the level of smoking among women has been much on the rise. It takes many years of continued smoking, 25 years on the average, to produce a lung cancer and the habit is still largely confined to women under the age of 50 years, younger than the ages at which the majority of lung cancers occur. Human behaviour is impossible to predict and it remains to be seen whether the level of cigarette smoking among women will ever reach that of men. It certainly appears likely to among those of lower socio-economic status. A further imponderable is that for some reason, in which smoking habits are at least a factor, women appear to show a slightly lower risk of incurring a lung cancer. Weighing up all these factors, the implications are clear - a substantial increase in lung cancer possibly even of minor epidemic proportions, will eventuate in women within the next twenty-five years.

Reasons which can be advanced for the increase in cigarette smoking among women are - equality sought with men in all things, the increase in household spending money, suburban social habits, boredom, tension and neurosis. plus the common false belief that lung cancer is a disease which affects men only.

Cigarettes which are less hazardous with reduced tar and nicotine content are being produced in some countries, notably the U.S.A. A high awareness

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[1] Doll, R. and Hill, A.B. (1964). Mortality in relation to smoking: Ten years observations in British doctors. Br.med. J.: 1399-1410; 1460-67

of the risks involved in cigarette smoking exists in our younger generations. Both these factors could have some ameliorating effect on the forecasts made.

1.5 Deaths - the possible effect of urbanisation

Apart from the known effect of cigarette smoke as a causative factor in lung cancer, heavy industrial pollution can have an influence on the incidence of the disease. However, the major effect of industrial pollution is considered by most authorities to be largely synergestic or aggravating only and the measured differences between urban and rural lung cancer death rates which appear in many heavily industrialised overseas countries largely disappear when the incidence in non-smokers only is compared. Ernest L. Wynder, President and Medical Director, American Health Foundation, New York, N.Y. comments:[1]

> "Most investigations agree that upon appropriate standardization for tobacco usage, the rate of lung cancer in urban and rural areas shows very small differences. The small urban-rural differences which have also been found for many other types of cancer may well be accounted for by more occupational exposures and better diagnostic facilities prevailing in urban areas. No relationship could be found by Buell, Dunn and Breslow in various counties in California, between lung cancer and the presence of air pollution[2]. These studies and others support Sir Richard Doll's original speculation that '- the incidence of lung cancer in non-smokers may be the same - in residents in areas of different density of population'[3]."

1.5.1 Urban and non-urban comparison

The New Zealand situation in lung cancer deaths registered over the ten-year period 1959-68 is examined in the following table. The census populations of 1961 and 1966 have been used as a base. The 'observed' figures are the actual numbers of deaths occurring in the respective areas or aggregations of areas while the 'expected' figures are the summation of the calculated numbers of deaths when the death rates for the whole country over the period are applied to the resident populations, age group by age group. Maoris have been included and this possibly could have a slight inflationary effect on the non-urban rates, although Maoris of both sexes are well represented in the urban population of today.

A qualification to these figures is that the analysis is according to the domicile of the deceased person at the time of death. A high proportion of lung cancer deaths take place in the older ages or frequently the years of retirement when the deceased would, in an unknown number of instances, have moved from the place of residence occupied for most of the working life. It is impossible to say whether on balance more persons of middle or older ages move from an urban environment to a non-urban than do those who change in the opposite direction.

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[1] Wynder, E.L. (1972) Etiology of lung cancer, Cancer 30: No. 5, 1335

[2] Buell, P.E., Dunn, J.E. and Breslow, L. (1967) Cancer of the lung and Los Angeles type air pollution. Prospective Study. Cancer 20: 2139-47

[3] Doll, R. (1953) Mortality from lung cancer among non-smokers. Br. J. Cancer 7: 303-312

Wellington and Hutt urban areas have been combined by reason that they are contiguous and there is a regular internal movement of their populations. "Other North Island urban areas" comprise the cities of Whangarei, Hamilton, Tauranga, Rotorua, Gisborne, New Plymouth, Napier, Hastings and Palmerston North. "Other South Island urban areas" comprise three cities only - Nelson, Timaru and Invercargill. "Remainder North Island" and "Remainder South Island" are made up of the boroughs, town districts and county areas of each of the two Islands and may be considered as comprising those qualifying as dwellers in a rural environment.

URBAN AND NON-URBAN DEATHS FROM LUNG CANCER, 1959-69

Area	Sex	1959-63 (5 years)		1965-69 (5 years)		1959-69(10 years)	
		Observed number of deaths	Expected number of deaths	Observed number of deaths	Expected number of deaths	Observed number of deaths	Expected number of deaths
Auckland urban area	Males	460	405	564	558	1,024	963
	Females	84	72	97	92	181	164
Wellington/Hutt urban area	Males	280	203	301	266	581	469
	Females	51	37	50	44	101	81
Christchurch urban area	Males	190	194	269	258	459	452
	Females	27	36	29	45	56	81
Dunedin urban area	Males	111	93	139	117	250	210
	Females	19	18	13	21	32	39
Other South Is. urban areas	Males	69	82	93	108	162	190
	Females	13	15	6	19	19	34
Other North Is. urban areas	Males	258	285	401	392	659	677
	Females	42	48	66	64	108	112
Remainder, North Island	Males	404	468	567	590	971	1,058
	Females	65	65	118	81	183	146
Remainder, South Island	Males	221	262	290	334	511	596
	Females	29	38	34	46	63	84

Probably because extreme environmental contrasts do not exist in New Zealand, the analysis does not reveal any clear-cut urban bias. The two predominantly non-urban or rural aggregations, Remainder North Island and Remainder South Island, show the anticipated lower experience in the male sex; in the female sex, however, only the Remainder North Island dweller shows a significantly lower incidence with the reverse situation in the Remainder South Island dweller. Auckland, by far the largest New Zealand urban centre, with a population at risk (at ages over 35 years) of more than 200,000, has close to the average New Zealand lung cancer experience.

Wellington/Hutt urban areas show significantly higher observed deaths over the expected number. As the windiest locality in New Zealand, persistent atmospheric pollution is an unlikely factor. A much more likely explanation is the fact that it is the government and commercial administrative centre of the country, with higher than average proportions employed in clerical or non-manual occupations (see Part B - Section 4).

Christchurch, by far the largest South Island centre with a considerable amount of heavy industry and a recurrent smog problem, shows the average New Zealand experience in males and a significantly low experience in females. Dunedin urban area shows a significant excess of deaths in the male sex but the reverse in the female sex.

The aggregation of smaller North Island urban areas shows the New Zealand average incidence. The aggregation of small South Island urban centres shows a significantly lower lung cancer death experience in both males and females.

1.5.2 The greater susceptibility of the United Kingdom immigrant

An analysis of the 1949-53 lung cancer deaths by D.P. Eastcott[1] showed that immigrants to New Zealand from the United Kingdom had a much higher incidence of lung cancer than the New Zealand born person largely of the same stock. The difference was greater in those who had arrived in New Zealand at older ages, that is, had been exposed to a different environment for a longer period of time. Eastcott established the chances of dying of cancer of the lung as being 30 percent higher for all United Kingdom immigrants but for those who were 30 years of age or more on entering New Zealand, the risk was calculated to be 75 percent higher.

Eastcott's conclusion was that immigrants from Great Britain to New Zealand are more susceptible to lung cancer through being affected by their former environment in highly urbanised and industrialised Britain and that this effect is related to the length of exposure in that environment. At a later date, a similar situation was found to exist in English migrants to South Africa.

A similar type of analysis carried out for the more recent ten-year period 1959-68 has produced similar results.

The method of comparison adopted was to apply the death rates over the period 1959-68 for the New Zealand born population (non-Maoris only) to the population of United Kingdom born immigrants in the age groups 35-, 45-, 55-, 65- and 75+. The expected number of deaths so calculated in each age group were then added together. The United Kingdom born immigrants were divided into those arriving in New Zealand at ages under 30 years and those arriving at ages over 30 years. The results were:

LUNG CANCER DEATHS, IN NEW ZEALAND, OF UNITED KINGDOM IMMIGRANTS

	MALES		FEMALES	
	Observed number of deaths	Expected number of deaths	Observed number of deaths	Expected number of deaths
Age at immigration from United Kingdom under 30 years of age	633	575	82	64
Age at immigration from United Kingdom over 30 years of age	481	318	84	47
All United Kingdom immigrants	1,114	893	166	111

[1]Eastcott, D.P. (1956). The epidemiology of lung cancer in New Zealand. Lancet, 270-I: 37-39

For those under 30 years of age on arrival, the disparity was ten percent in men and 28 percent in women.

For those over 30 years of age on arrival, the disparity was 51 percent in men and 78 percent in women.

For all immigrants the disparity was 20 percent in men and 50 percent in women.

1.6 Deaths - the distribution by age and sex

The following table analyses the distribution of lung cancer deaths occurring in 1971, the latest year for which data are available, by the age at death. These figures have been extracted from Table 2.

The greatest number of male lung cancer deaths are at ages 65-69, followed by ages 60-64 and then ages 70-74. In females, the most common age at death from this condition has become over more recent years aged 75 and over, followed closely by ages 55-59 and 60-64.

The table shows that proportionately more women than men are diagnosed at very young ages - under 45 years.

DISTRIBUTION OF DEATHS FROM LUNG CANCER BY AGE AND SEX RATIO, 1971

Age	Number		Percent		Male/Female ratio
	Male	Female	Male	Female	
ALL AGES	678	135	100.0	100.0	4.3 : 1
Under 45	18	11	2.6	8.1	1.6 : 1
45 - 54	71	16	10.4	11.9	4.4 : 1
55 - 64	202	46	29.8	34.1	4.4 : 1
65 - 74	265	39	39.0	28.9	6.8 : 1
75 and over	122	23	17.9	17.0	5.3 : 1

The more tragic side of lung cancer is the involvement of the comparatively young and the reduction of the normal expected life-span. In 1971, 291 men and 73 women died of lung cancer before the age of 65 years. As a proportion of the total lung cancer deaths in 1971, these numbers comprise 43 percent and 54 percent respectively. A sad portend for the future may be seen in the lower male to female ratio at the younger ages.

SECTION 2 : CASES REGISTERED - COMMENT

New Zealand has maintained a cancer case registration system since 1948, the main source of case histories being the public hospitals where the majority of cancer patients receive their treatment. Of more recent years, a growing percentage of private hospital cases have been reported to the National Cancer Registry. In cases of cancer of the lung and bronchus, it is calculated that approximately 93 percent of cases diagnosed are reported to the Registry.

Figures covering new cases registered are contained in Tables 4 and 5 in Appendix A.

For the reasons that (a) not all lung cancer cases become registered, and (b) the proportion that were registered has changed over a long period of time, and (c) a high proportion of cases diagnosed die of the disease, death material is preferred to registration material as a more accurate guide to changes in the incidence of the disease. It will be seen, however, from a comparison of the deaths in each year with the cases registered in the same year that overall new registrations do exceed the death totals as indeed they should be expected to if only for the reason that not all lung cancer patients die of lung cancer - a number die of some intercurrent condition. Furthermore, because most persons in whom lung cancer is diagnosed survive for several months, there is a time lag of varying periods between the registration of the case and the eventual death.

2.1 Trends in new cases registered

The table which follows brings the totals of new cases registered and deaths into juxtaposition for each year from 1961 to 1970.

NEW CASES REGISTERED AND DEATHS FROM LUNG CANCER: NUMBERS, 1961-70

Year	MALES		FEMALES		BOTH SEXES	
	New cases	Deaths	New cases	Deaths	New cases	Deaths
1961	429	395	72	75	501	470
1962	469	438	70	61	539	499
1963	478	464	77	79	555	543
1964	502	476	87	80	589	556
1965	548	486	77	69	625	555
1966	608	536	113	73	721	609
1967	581	509	95	93	676	602
1968	710	627	121	102	831	729
1969	672	644	126	117	798	761
1970	717	680	145	149	862	829

The table serves to illustrate the rapid and lethal effect of lung cancer in that the numbers of new cases registered are never very far ahead of the numbers of deaths which take place.

There are two qualifications to this comparison, however, the first of which is that some small proportion of lung cancers, five percent at the most, are successfully treated to the extent that the patient dies of some other condition. The second qualification is that each year a

few cases of lung cancer which occur do not get reported to the National Cancer Registry and remain unregistered.

2.2 Estimate of cases unregistered and estimated true incidence

A formula adopted by the National Health Statistics Centre makes it possible to arrive at an estimate of the number of cases of lung and bronchus cancer which do not become registered. These estimates of unregistered cases when added to the yearly totals of new cases which are registered, permit an estimated approximate total to be made of all cases diagnosed in the community. These figures, with the death totals in juxtaposition, are as follows:

COMPARISON OF ESTIMATED TOTAL LUNG CANCER INCIDENCE AND ACTUAL DEATHS NUMBERS, 1966-70

	MALES				FEMALES				BOTH SEXES			
Year	Cases registered	Estimate of cases not registered	Estimate of total cases occurring	Deaths	Cases registered	Estimate of cases not registered	Estimate of total cases occurring	Deaths	Cases registered	Estimate of cases not registered	Estimate of total cases occurring	Deaths
1966	608	42	650	536	113	7	120	73	721	49	770	609
1967	581	39	620	509	95	5	100	93	676	44	720	602
1968	710	50	760	627	121	9	130	102	831	59	890	729
1969	672	48	720	644	126	4	130	117	798	52	850	761
1970	717	43	760	680	145	5	150	149	862	48	910	829

On the average the total of lung and bronchus deaths in each year is, it is estimated, around 100 below the total of cases actually diagnosed in that same year. In other words death figures are an understatement of around ten percent of the total lung cancer picture.

SECTION 3 : THE MAORI AND LUNG CANCER - COMMENT

3.1 Maori/European and Maori/Total population comparisons in deaths

The Maori population of New Zealand is small, numbering around one-quarter of a million. Furthermore, because of relatively high death rates in past years, it is a young population with only 25,000 Maori persons at ages upward of 45 years, ages when lung cancer most commonly occurs. For these reasons, the Maori lung cancer death total for any one year is small, at 35 men and 14 women - 1971 figures. However, when these tallies are related to the grand total of 150 Maori cancer deaths which occur annually, it is clear that on total population standards, quite disproportionate percentages of this are made up by lung cancer; in the male, one in every three cancer deaths is a lung cancer death and in the female, one in every six cancer deaths is a lung cancer death.

The contribution of each of the two races to the total lung cancer deaths is as follows, the figures being an aggregation of those occurring in the three years, 1969 to 1971.

MAORI/EUROPEAN COMPARISON IN LUNG CANCER DEATHS - NUMBERS
1969-71 (THREE YEARS)

Race	Under 35	35-	45-	55-	65-	75+	All ages
				MALES			
Maori	-	7	19	32	23	10	91
European	5	40	201	577	728	360	1,911
Total population	5	47	220	609	751	370	2,002
				FEMALES			
Maori	-	3	8	19	7	7	44
European	4	21	46	120	101	65	357
Total population	4	24	54	139	108	72	401

The most significant finding in this comparison is the high proportion of female deaths to male deaths at all ages in the Maori. The ratio of Maori to European in both population and in the lung cancer death figures in the above table at different ages is as follows:

Age	MALES		FEMALES	
	Population ratio	Lung cancer death ratio	Population ratio	Lung cancer death ratio
35-	1 to 16	1 to 6	1 to 14	1 to 7
45-	1 to 23	1 to 11	1 to 23	1 to 6
55-	1 to 30	1 to 18	1 to 35	1 to 6
65-	1 to 38	1 to 32	1 to 53	1 to 15
75 and over	1 to 66	1 to 36	1 to 111	1 to 8

In the male the lung cancer disproportion is at the younger and middle ages of under 60 years.

In the female the disproportion is at all ages.

Table 3 in Appendix A provides the age-specific death rates for the total population (Maoris plus Europeans) while Table 6 sets out the same for the Maori population alone. Placing these rates in juxtaposition, we obtain the following comparison:

MAORI/TOTAL POPULATION COMPARISON IN AVERAGE ANNUAL LUNG CANCER DEATH RATES
Rates per 100,000 of population at ages 1969-71

Age group	MALES		FEMALES	
	Maori	Total population	Maori	Total population
Under 25 years	-	-	-	-
25 - 29 years	-	1.1	-	-
30 - 34 years	-	1.2	-	1.2
35 - 39 years	-	3.9	-	4.0
40 - 44 years	42.9	15.7	21.6	6.4
45 - 49 years	117.2	35.6	-	6.4
50 - 54 years	106.3	65.9	108.8	18.3
55 - 59 years	313.9	120.9	147.6	36.3
60 - 64 years	237.1	228.4	211.3	40.3
65 - 69 years	559.2	377.5	206.2	40.9
70 - 74 years	320.0	398.8	174.8	46.1
75 years and over	606.1	381.1	412.4	44.5

Since the Maori forms part of the total population, the gap between the Maori and total population rates is an under-representation of the true differences between the Maori and the remainder of the population (mainly European). However, because the Maori population makes up such a relatively small proportion of the total population at these ages, the exclusion of the Maori figures from those of the total New Zealand population would not have any very great effect.

Over all ages combined the Maori male has around-about a fifty percent higher chance of dying from lung cancer than the average risk of the New Zealand male.

Over all ages combined the Maori female has a seven hundred percent higher chance of dying from lung cancer than the average risk of the New Zealand female.

The U.I.C.C. publication CANCER IN FIVE CONTINENTS Volume II edited by Doll and Waterhouse[1] sets out a world ranking list for 60 racial groups for lung cancer, in which the New Zealand Maori male holds the 8th position (European 19th) and the New Zealand Maori female holds 1st position (European 26th).

Attention was first drawn to the extremely high female rates in the Maori and the suspected backgrounds causes as far back as 1960 in a New Zealand Department of Health report.[2]

[1] Cancer in Five Continents, International Union Against Cancer, Vol. 11
[2] Rose, R.J. (1960). Maori-European Standards of Health. New Zealand Department of Health Special Report Series 1.

> "The survival rates for cancers sited in the respiratory organs (principally lung) are extremely low. For this reason, the mortality figures are likely to be a true measure of incidence. In Maori men, the lung cancer rate is higher than the European at all ages. In Maori women, the incidence judged on mortality, is four times higher than the European.
>
> Accepting this proportion as a true index, the Maori female would have, it is estimated, the highest rate in the world in this sex for lung cancer. Close examination of the medical certificates shows that post-mortem confirmation of the diagnosis was availed of in very few of these deaths and there is a possibility of a misdiagnosis, particularly in that a secondary growth in the lung could be mistaken for a primary. Of particular note were the number of cases where the malignancy had developed in a long-standing tuberculous infection of the lung.
>
> It is probable that some of this excess in bronchogenic cancer is in accordance with the greater vulnerability of the Maori to all types of lung disease. It is known, for example, that chronic tuberculosis and bronchiectasis can develop into cancer. However, and this is from observation only, many Maori women of today smoke heavily and furthermore the habit was known to be common in the Maori female at an earlier period than in the European, so that this factor must also be considered."

No. 37 in the same Special Report Series issued in 1972[1] contains the following observations on page 35, concerning malignant neoplasm of the lung and bronchus:

> "An extremely high incidence of lung cancer exists in the Maori of both sexes. For the reason that the number of cases involved is small, this phenomenon has not drawn the attention it deserves and there is unquestionably a need for epidemiological study of the background habits, smoking in particular, and past known medical history of lung cancer cases reported to the National Cancer Registry."

3.2 Maori cases registered and estimated true incidence

Table 8 in Appendix A presents the age distribution of new Maori cases registered while Table 10 provides an estimation of the number of cases which actually occur. This estimation of true incidence is arrived at by adding deaths which were not those of registered cases to all cases registered. The tables summarise as follows:

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[1] Rose, R.J. (1972). Maori-European Comparisons in Mortality, New Zealand Department of Health Special Report Series 37

ESTIMATED LUNG CANCER INCIDENCE IN THE MAORI - NUMBERS, 1968-70

Year	MALES			FEMALES		
	Cases registered	Cases not registered in deaths	Total estimated incidence	Cases registered	Cases not registered in deaths	Total estimated incidence
1968	22	3	25	15	3	18
1969	36	4	40	11	1	12
1970	25	3	28	7	2	9

In actual numbers, the figures of Maori lung cancer cases are small and their smallness raises some queries in interpreting them as showing an extraordinary high incidence especially in the female in particular. Nevertheless, from year to year the figures are consistent, and still further the disparity with the remainder of the population is increasing rather than decreasing.

3.3 Suspected causal factors in the Maori

The Maori has a higher susceptibility to any type of respiratory disease as revealed by death and morbidity data[1]. However, the prime causal factor in lung cancer is cigarette smoking and there is a great deal of evidence that the Maori female right down to school ages is a very heavy cigarette smoker.[2] Small surveys seem to show that about two-thirds of Maori women smoke cigarettes as compared with about one-third of European women.[3] Again, they seem to be heavier smokers than their European counterparts and their cigarette smoking habits appear to conform more to the male style of smoking, particularly in respect of inhaling. Still further, Maori women have a smoking history far beyond that of European women. Pipe smoking, in particular, became a common custom among Maori women shortly after the time of the first contact with the European migrant.

3.4 The scope of an epidemiological study of the Maori

A summary of the points which could only be clarified by a properly planned epidemiological investigation are as follows:

1. To what extent are the recorded statistics of deaths and incidence an accurate measure of the situation, that is, what proportion of Maori cases are confirmed cases of primary lung carcinoma?

2. Are there special histological features in the Maori cases of lung cancer?

3. Is there a higher incidence than average of pre-existing respiratory disease in Maori cases of lung cancer?

4. Is there above average delay by Maoris in reporting to a doctor when the symptoms of lung cancer are clear-cut?

[1] New Zealand Department of Health Special Report Series Nos. 1, 25 and 37

[2] Prior, I.A.M. (Unpublished papers)

[3] Prior, I.A.M. (Personal communication)

5. What causal factors - but particularly cigarette smoking - are suspected?

6. What are the smoking habits of the Maori and how do they differ from the European?

7. How does the Maori compare with the European in the incidence of other tobacco related morbidity?

PART B : CLINICAL AND EPIDEMIOLOGICAL SURVEY

Introduction

In 1957 the surgeons-in-charge of the four Regional Thoracic Surgical Units in New Zealand at Auckland, Wellington, Christchurch and Dunedin, namely Sir Douglas Robb, Mr. James Baird, Mr. Heath Thompson and Mr. John Borrie agreed to pool and correlate all data relating to the patients treated in these Units for lung cancer. The National Health Statistics Centre of the Department of Health acted as the central collecting agency, as well as carrying out the matching of the case histories forwarded with the records of the same persons contained in the National Cancer Registry. Mr. H.L. Wood of the Centre carried out these functions, as well as supervising the transfer of the data onto punched cards. The four originators of the scheme met and drew up a protocol which the Department of Health printed and circulated to the four Regional Thoracic Surgical Centres in New Zealand (Form H-MS50). This protocol was followed and the information requested supplied from 1957 through 1965. A copy of the pro-forma is published in Appendix B.

The analysis of the punched cards was carried out in the University of Otago Computing Centre in 1969. Preliminary findings were presented by Professor Borrie at the Department of Surgery, University of Vienna, at the Department of Surgery at Harvard Medical School, Massachusetts General Hospital, Boston in 1970, as well as to the Thoracic Society of New Zealand at its Rotorua meeting of the same year.

Guided by the preliminary findings, further analyses in depth have been carried out. In addition the 186 survivors at the time the survey closed (1965) were followed through to the end of 1969. The range of follow-up is thus from five years to 15 years, depending on whether the patients first presented in 1965 or further back as far as 1957.

The writers of this section of the report wish to acknowledge the unstinted help given them by the many doctors who have trained in the four Regional Thoracic Centres during the period of nine years over which the survey was conducted.

A total of 2,848 patients was covered by the Survey.

SECTION 1 : AGE

The ages at date of diagnosis and the percentages of the total in each age group of the 2,848 patients included in the survey were as follows:

Age group	MALES		FEMALES		PERSONS	
	Number	Percentage at each age	Number	Percentage at each age	Number	Percentage at each age
Under 20 years	1	0.04	1	0.3	2	0.1
20 - 29 "	8	0.3	1	0.3	9	0.3
30 - 39 "	39	1.6	16	4.8	55	1.9
40 - 49 "	209	8.3	44	13.2	253	8.9
50 - 59 "	700	27.8	78	23.4	778	27.3
60 - 69 "	964	38.3	122	36.7	1,086	38.1
70 +	594	23.6	71	21.3	665	23.4
Total, all ages	2,515	100.0	333	100.0	2,848	100.0

The pattern of age incidence is similar to that of other Western societies. Few developed lung cancer under the age of 40; the highest proportion of 38 percent or over one-third came in the 60-69 age group but with over one-quarter in the preceding decade of 50-59 years.

The two cases under the age of 20 years were children - a girl aged 5 years and a boy aged 7 years, both of whom had unusual features.

SECTION 2 : COUNTRY OF BIRTH

Two-thirds of the patients in the survey were New Zealand born; one in four had their origin in the United Kingdom. The remainder, eight percent in all, had been born in other overseas countries.

Country of birth	Males	Females	Persons
New Zealand	1,680	229	1,909
United Kingdom	629	82	711
Australia	64	4	68
China	24	2	26
Yugoslavia	18	-	18
Other countries	100	16	116
Total cases	2,515	333	2,848

The average length of residence in New Zealand of the above patients according to country of birth was:

New Zealand	62 years
Australia	48 "
United Kingdom	37 "
Yugoslavia	49 "
China	35 "

SECTION 3 : RACE

The officially recognised racial division in New Zealand is as between Maori and non-Maori. A Maori is an indigenous Polynesian of half or over half Maori ancestry. Any person not conforming to the criteria of Maori is labelled "Non-Maori". The latter group includes a very large proportion of persons of European stock. Lesser proportions are those with less than fifty percent Maori blood - Pacific Islanders, Chinese, Indians and other minority racial groups.

The analysis of patients in the two recognised racial subdivisions is as follows:

	Males	Females	Persons
Non-Maori	2,449	304	2,753
Maori	66	29	95
Total cases	2,515	333	2,848

Ninety-seven percent of the male patients in the survey whose race was recorded were Non-Maori as against only 3 percent Maori; in females the comparative proportions were 91 percent and 9 percent respectively.

In actual numbers, the Maori totals for each sex are very small when compared with the Non-Maori totals. However, as discussed earlier in Part A DEATHS, Section 3, there is a quite disproportionate occurrence of lung cancer in the Maori when the relative size of the populations at ages when exposed to the risk of getting lung cancer is taken into account. This is done in the following table in which the population figures are the average of those recorded in the two censuses, 1961 and 1966. The numbers of cases included in the survey for each of the two racial divisions have been set against the populations at risk, and incidence or frequency of occurrence rates has been calculated in each age group in each sex. The very small numbers of Maoris in the New Zealand population at all adult ages but in particular those in the higher age brackets are of particular significance in this comparison, especially in the 40-59 age groups for men, and the 40-69 age groups for women.

Comparisons in death rates (see page 15) and in new cases registered with the National Cancer Registry (see Tables 5 and 9 in Appendix A) show clearly that the Maori of both sexes has a higher propensity for developing lung cancer than the remainder of the population. However, it is in the female that the gap between the races is widest. This clinical survey of cases referred to hospital for treatment confirms the above findings.

Age group	NON-MAORI			MAORI		
	Population at risk*	Number of cases	Incidence rate per 10,000 (5 years)	Population at risk*	Number of cases	Incidence rate per 10,000 (5 years)
	MALES					
20 - 29	152,664	8	0.5	12,848	-	-
30 - 39	146,302	39	2.7	9,088	-	-
40 - 49	139,073	194	14.0	6,243	15	24.0
50 - 59	112,255	671	59.8	3,948	29	73.5
60 - 69	75,259	948	126.0	2,052	16	78.0
70 +	57,507	588	102.2	1,030	6	58.3
	FEMALES					
20 - 29	144,905	1	0.1	12,880	-	-
30 - 39	140,724	15	1.1	9,100	1	1.1
40 - 49	136,961	39	2.9	5,902	5	8.5
50 - 59	111,393	73	6.6	3,422	5	14.6
60 - 69	84,318	108	12.8	1,723	14	81.3
70 +	75,676	67	8.9	899	4	44.5

* Average of 1961 and 1966 census figures

In the above table, higher Maori incidence rates are recorded in the male up to the age of sixty years. In the female the disparity between the two racial groups is very marked at all ages over 40 years. The high Maori female incidence figures can be explained by heavy cigarette smoking over a long period of time. Recorded history - both written and pictorial - tells us that the cigarette smoking habit was in vogue among Maori women at a very much earlier period of time than among European women. From observation only, it would appear that the level of cigarette smoking among Maori girls and Maori women of today is very much closer to that of Maori men than is the case with the European. That fine portrait by the artist C.F. Goldie of "The Cigarette Smoker" (reproduced in the frontispiece) depicts an elderly, dignified Maori lady who was clearly well experienced in the habit. This was in 1910. In depicting a commonplace happening of sixty years ago, the artist could not have foreseen the bushfire spread of the habit among the Maori which has lead to the situation today whereby Maori women have the highest lung cancer incidence of any racial group of the same sex in the world. However, there may well be medical reasons as well as sociological reasons to explain some part at least of this extra-ordinary situation.

SECTION 4 : OCCUPATION

The classification of occupational groupings which follows is that adopted for the 1961 New Zealand Census of Population. The analysis is of male cases only.

Occupational Group	Percentage of group in total population 45 years and over	Percentage of group of total males in survey
Professional	6.4	3
Administrators	10.4	16
Clerical	8.0	9
Wholesale and retail	6.1	4
Farmers	19.1	11
Miners	0.8	2
Transport	5.9	8
Craftsmen	37.9	35
Personal service	4.8	5
Armed Forces	0.4	1
Other	0.3	5

Only 3 percent of those patients in the survey were classified as working in a profession as against a 6.4 percent in the working population, aged 45 years and over.

Administrators totalling 10.4 percent of the working population showed a 16 percent lung cancer representation in the survey patients. Transport workers had an 8 percent lung cancer representation as against 5.9 percent of the working population. Farmers comprising 19.1 percent of the same population, contributed 11 percent only to the survey total.

The above differences are possibly significant, even allowing for less precision in the recording of occupation on the survey collection form than in the national census. The explanation could lie in differences and changes in the 'intensity of cigarette smoking behaviour' in socio-economic groups as well as in working environments.

SECTION 5 : PRIOR RESPIRATORY DISEASE

The analysis of history of prior respiratory disease in the 2,749 cases where this knowledge was obtainable, both sexes combined, was as follows:

	Number	Percentage
No pre-existing respiratory disease	1,970	72
Chronic upper respiratory disease	61)	
Pulmonary tuberculosis	97)	
Chronic bronchitis	457)	28
Bronchiectasis	11)	
Pneumoconiosis	14)	
Other respiratory disease	139)	
Total cases	2,749	100

In 72 percent of the survey patients, there was no recorded history of prior respiratory disease; in the remaining 28 percent of cases, a respiratory disorder had been present prior to the diagnosis of the malignant tumour. In any random matched sample of persons without evidence of lung cancer, there is no likelihood whatsoever of finding an incidence of over 1 in 4 affected with a specific lung lesion. The indications are that persons who have a history of chronic lung disease, such as chronic bronchitis, are at relatively high risk of contracting a frank lung cancer, but the absence of a control group makes it impossible to verify this.

When analysed according to whether European or Maori there were interesting findings in respect of chronic bronchitis and pulmonary tuberculosis.

	European	Maori	Total
No pre-existing respiratory disease	1908 (71.8)	62 (68.1)	1970 (71.7)
Chronic upper respiratory disease	59 (2.2)	2 (2.2)	61 (2.2)
Chronic bronchitis	447 (16.8)	10 (11.0)	457 (16.6)
Pulmonary tuberculosis	85 (3.2)	12 (13.2)	97 (3.5)
Bronchiectasis	9 (0.3)	2 (2.2)	11 (0.4)
Pneumoconiosis	14 (0.5)	0 (0.0)	14 (0.5)
Other respiratory disease	136 (5.1)	3 (3.3)	139 (5.1)
Total (known)	2658	91	2749

The figures in brackets are percentages of the total for the race

The two prominent differences are:

(i) Chronic bronchitis - with the European proportion higher but not significantly so (Chi-square = 2.16, 1 df, 0.1 - P - 0.2)

(ii) Pulmonary tuberculosis - with the Maori proportion very significantly higher than that of the European. (Fisher's "exact probability" is less than 0.001). It would be rash to interpret this as indicating any association in the Maori of tuberculosis and lung cancer as it seems probable that it simply reflects a higher incidence of Tb in the Maori.

SECTION 6 : PREVIOUS HISTORY OF CANCER

The analysis of the record of previous history of cancer in (a) the patient and (b) blood relatives in the 2,622 cases where the information was recorded, was as follows:

	Number	Percentage of Known
History of cancer in patient	83	3
History of cancer in blood relative	153	6
History of cancer in both patient and blood relative	-	-
No history of cancer in either patient or blood relative	2,386	91
Total cases	2,622	100

In 91 percent of the cases, there was no recorded history of a cancer in either the patient or his or her blood relatives.

Three percent of the patients from whom the information was obtainable had a history of cancer in another site or organ.

Six percent of those cases in which the information was obtainable knew of a cancer diagnosed in a blood relative.

SECTION 7 : MODE OF PRESENTATION

7.1 Commonest presentation and site:

The commonest presentations of specific respiratory symptoms in those cases where such were noted, subdivided according to site of lung cancer, were as follows:

Commonest presentation	Site				Total	
	Central		Peripheral			
	Cases	Percentage	Cases	Percentage	Cases	Percentage
Cough	390	22	145	15	535	20
Chest pain	325	19	195	21	520	19
Blood spitting	294	17	119	13	413	15
Shortness of breath	165	9	62	7	227	8
Radiographic	70	4	155	16	225	8
Other	501	29	269	28	770	29
Total cases	1,745	100	945	100	2,690	100

The common presentations in over one-third of the total were cough and chest pain. Cough was commoner in centrally sited tumours than in peripherally sited. Blood spitting was a common symptom, presenting in 15 percent of total cases. Chest pain was the reverse. The explanation lies in the gross pathology of the tumours at these various sites, a central tumour forming production of blood by acting like a foreign body, and part-occluding a main bronchus. A peripheral tumour more likely causes pleural pain. Radiographic chance findings were the second most common presentation in the peripheral group of lung cancers. (This table is concerned only with central and peripheral sites).

7.2 Mode of presentation

The following table analyses the findings according to specific syndromes:

Mode of presentation	Cases	Percentage
Blocked bronchus syndrome	2,045	72
Chance X-ray	230	8
General symptoms with lassitude and loss of weight	217	8
Metastases	163	6
Medical check	36	1
Peripheral neuritis	10	-
Others	147	5
Total cases	2,848	100

The tabulation 'Mode of presentation by race' showed a similar pattern between Europeans and Maoris.

Seventy-two percent of all cases presented with blocked bronchus syndrome or some variation on it. Eight percent of all cases were chance radiographic findings. General symptoms such as malaise, weight loss, loss of energy, also accounted for eight percent. Six percent were revealed solely by the finding of a metastasis. Medical check-up revealed the condition in one percent of cases. None of the rarer presentations listed such as Horner's syndrome, finger clubbing, wheeze and peripheral neuritis accounted for even one percent of the total.

Metastases led to the discovery of the disease in 163 or 6 percent of cases. The exact siting of the metastases on which initial diagnosis was made were:

a. Distant metastases 76

b. Hoarseness or aphonia indicating L.hilar metastases 45

c. Mediastinal obstruction (caval or oesophageal) or other lymph node metastases 42

When these modes of presentation are considered in conjunction with the 13 percent of patients discovered to have lung cancer only at autopsy (see Section 11) then one's view is reinforced that above all it is (a) the great masquerader and (b) a very nasty disease - best avoided.

SECTION 8 : DURATION OF SYMPTOMS

A feature of lung cancers is their lethal nature. The rapidity with which malignant cells originating in the lung can locally invade and distally metastasise has been well established. The following table shows the lapse of time before the disease was diagnosed in the 2,816 cases where the information re symptoms was obtained.

Duration of symptoms before diagnosis	Cases	Percentage of known
No symptoms	175	6
0 - 3 months	1,454	51
4 - 6 months	616	22
7 - 12 months	378	13
13 - 24 months	117	4
24 months and over	76	3
Not known	32	-
Total cases	2,848	100

Six percent of the patients in this survey had observed no symptoms whatsoever, 51 percent gave a history of up to 3 months and 22 percent from 4 up to 6 months. Indeed, there were 7 percent of the total of patients in the survey who had delayed for over a year before seeking medical attention. It would be expected that those patients who delayed seeking a medical opinion would usually be those where the symptoms were of a less severe nature. In general, the earlier disease was detected and treated, the longer the period of survival. Delay in reporting of these symptoms and detecting disease, and referring the patients for curative treatment, are among any surgeon's most unhappy experiences. Patients with 'above-normal susceptibility' - as most of those in this survey were - should, in their own interest, have been alert to any type of respiratory symptom, and had annual check chest films.

The tabulation of 'Delay in reporting from Symptoms' according to race and ignoring subjects with no symptoms and those for whom the data are not known, reduces to:

Delay	European	Maori	Total
0- 3 months	1,408	46	1,454
4- 6 months	596	20	616
7-12 months	366	12	378
13-24 months	113	4	117
Over 24 months	68	8	76
	2,551	90	2,641

In terms of percentages of race-totals according to 'Delay in reporting Symptoms' the first four categories show Maoris reporting somewhat earlier than Europeans.

European	Maori
55.2	51.1
23.4	22.2
14.3	13.3
4.4	4.4
2.7	8.9

There is a high proportion of Maoris in the 'long delay category(8 people) but in view of the numbers this is of no statistical significance whatsoever.

SECTION 9 : INITIAL X-RAY FINDINGS

The appearances after the initial X-ray investigations are listed as follows:

Initial X-ray findings	Cases	Percentage of known
Hilar opacity	678	25
Peripheral opacity	590	22
Lobar collapse	509	19
Pneumonic consolidation	472	17
Other	184	7
Cavitation	98	4
Opacity and collapse	87	3
Multiple opacity	68	2
Normal chest film	38	1
Not known	124	-
Total cases	2,848	100

The most common finding, 25 percent of cases, was hilar opacity, closely followed by peripheral opacity 22 percent of cases, lobar collapse 19 percent and pneumonic consolidation 17 percent.

Midway through the survey, a new category was added, namely "normal chest film" in which the diagnosis was proven by sputum cytology and/or bronchoscopic biopsy. Had this category been recognised as being necessary when the collection form was drawn up, it is certain that the one percent figure for a 'normal chest film' would have been increased.

SECTION 10 : PART OF LUNG AFFECTED

The analyses of cases according to anatomical sites of the cancers diagnosed are presented in the three tables which follow:

Lung affected	Cases	Percentage of known
Right lung	1,443	52
Left lung	1,290	46
Both lungs	46	2
Not known	69	-
Total cases	2,848	100

The lesions were distributed through the right and left lungs in proportions closely following the normal anatomical distribution of lung volume, that is - 52 percent sited in the right lung, 46 percent in the left lung with 2 percent involving both lungs.

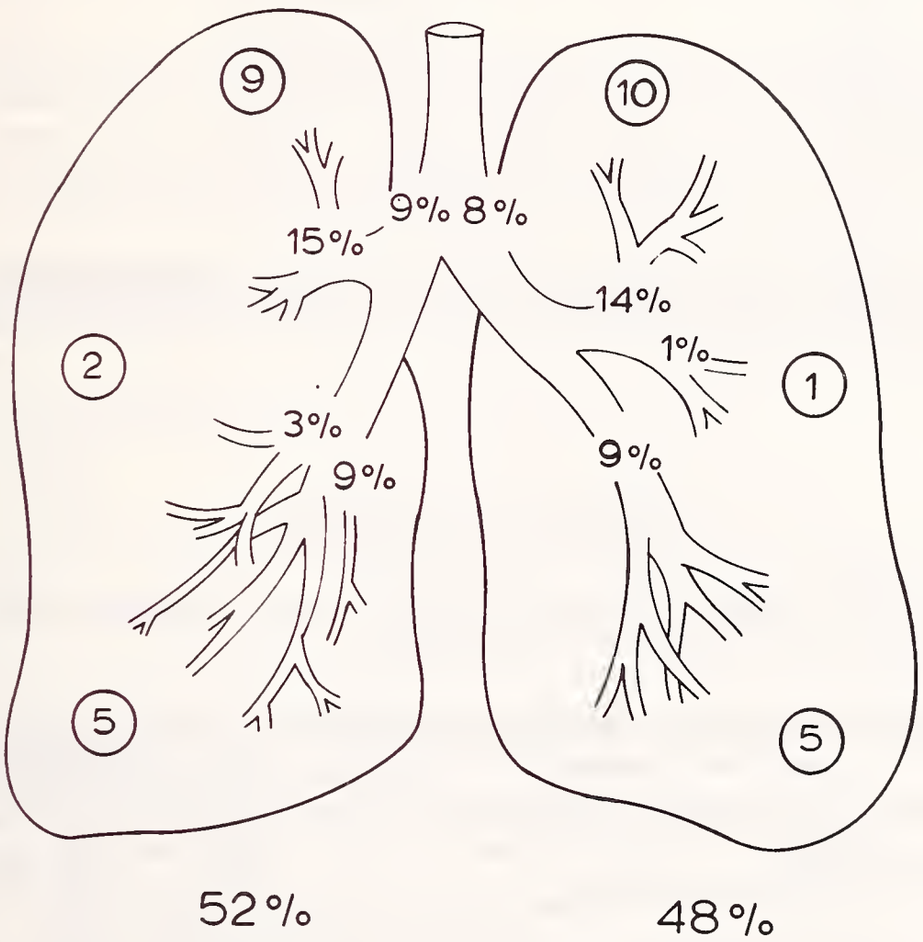
The particular location of the cancers found, whether central or peripheral group, were as follows:

Site	Cases	Percentage of known
Central	1,747	64
Peripheral	985	36
Trachea	2	-
Not known	114	-
Total cases	2,848	100

The lobar site percentage distribution, central and peripheral, showed thus diagrammatically:

FIGURE 2

The lobar site percentage distribution of Primary Lung Cancers in this survey, divided into those in central bronchi, (up to and including the origins of the secondary bronchi), and those in peripheral bronchi



The distribution in tabulation presentation is as follows:

LOBAR SITE PERCENTAGE DISTRIBUTION			
Central		Peripheral	
	Percentage		Percentage
R. main bronchus	9		
R. upper lobe	15	R. upper lobe	9
R. mid-lobe	3	R. mid-lobe	2
R. lower lobe	9	R. lower lobe	5
L. main bronchus	8		
L. upper lobe	14	L. upper lobe	10
Lingula origin	1	Lingula origin	1
L. lower lobe	9	L. lower lobe	5
Total, central	68	Total, peripheral	32

These figures indicate that those portions of the lung exposed to tobacco smoke in high concentration, especially the main bronchi and origins of the secondary bronchi, are those more likely to be the site of mucosal mutation and primary lung cancer formation.

SECTION 11 : DIAGNOSIS

The conclusive diagnosis was made by finding the neoplastic cell. The bases for diagnoses were distributed as follows:

Basis for diagnosis		Cases	Percentage of total	
Cytology	(pleural fluid	50	2)	
	(sputum	402	14)	20%
	(bronchial washings	114	4)	
Biopsy	(bronchoscopic	779	27)	
	(needle or aspiration	88	3)	
	(lymph node	162	6)	58%
	(thoracotomy	627	22)	
Autopsy		367		13%
Clinical	(non-proven histologically)	259		9%
Total cases		2,848		100

This lung cancer study was carried out at a time when cytology laboratories in New Zealand were being developed. Thus, sputum cytology accounted for only 14 percent of known cases, whereas bronchoscopic biopsy was conclusive in 27 percent and indeed, thoracotomy - as the basis of diagnosis - in 22 percent of known cases. It is noteworthy that in this series, autopsy provided the diagnosis in 13 percent of cases: in 9 percent the diagnosis was clinical - unsupported by histological proof. In 91 percent it was histologically proven.

SECTION 12 : CELL TYPES

12.1 Pathological findings

The following table compares the pathological findings in males and females:

Cell type	Cases		Percentage of known total	
	Males	Females	Males	Females
Squamous	1,138	72	49	23
Small cell undifferentiated	575	91	24	30
Large cell undifferentiated	439	55	18	18
Adenocarcinoma	202	70	8	23
Bronchiolar (alveolar cell)	22	13	1	4
Adenoma - cylindroma	3	-	-	-
Adenoma - carcinoid	6	6	-	2
Other and not proven	130	26	-	-
Totals, all types	2,515	333	100	100

There was a wide disparity between the totals of male and female cases, 2,515 compared with 333. The differences in cell types as between the sexes were statistically significant.

Squamous cell tumours were seen in 49 percent of the total of male cases as against 23 percent in the total of female cases.

Undifferentiated cell tumours, whether small cell or large cell, were equally common in male and female cases.

Adenocarcinoma was very much more common among females, contributing 23 percent in females as against 8 percent in males.

Broncho-alveolar cell carcinoma, rare at any time, was very much more common in this study in females - 4 percent of the total.

12.2 Cell type by race

A question naturally arising is whether there are racial differences in cell types. The following table compares the histological distribution of the races:

Cell type	MALES				FEMALES			
	Numbers		Percentage of known		Numbers		Percentage of known	
	Non-Maori	Maori	Non-Maori	Maori	Non-Maori	Maori	Non-Maori	Maori
Squamous	1,104	34	48	57	64	8	23	30
Small cell undifferentiated	558	17	24	28	81	10	30	37
Large cell undifferentiated	431	8	19	13	49	6	18	22
Adenocarcinoma	201	1	9	2	67	3	24	11
Bronchiolar (alveolar cell)	22	-	1	-	13	-	5	-
Other and not proven	133	6	--	--	30	2	--	--
Total, all types	2,449	66	100	100	304	29	100	100

-- Too small to be expressed

Squamous cell carcinoma of the lung is more common in the Maori of both sexes than in the non-Maori. This is in line with heavier-smoking habits of the Maori in both sexes.

On the other hand, the incidence of adenocarcinoma, the tumour most common in non-smokers, is markedly low in Maoris in both sexes.

12.3 Cell type by radiographic presentation

A cross-tabulation of cell type, both sexes combined, by radiographic presentation, yields most interesting data.

Radiographic presentation	Cell type					All types
	Squamous	Small cell	Large cell	Adeno-carcinoma	Not proven and other	
Pneumonia	227	101	75	42	27	472
Cavitation	59	10	18	8	3	98
Collapse	291	142	95	37	31	596
Hilar opacity	235	225	111	51	56	678
Peripheral opacity	233	91	116	88	62	590
Multiple opacities	28	19	9	8	4	68
Other	137	78	70	38	23	346
Totals	1,210	666	494	272	206	2,848

There is evidence of an association between the type of cell and the radiographic form of presentation as summarised below:

Significant associations ($P \leq 0.001$)

	Observed	Expected
Squamous presenting as cavitation = lung abscess	59	42
Squamous presenting as collapse	291	253
Squamous presenting as hilar opacity	235	288
Small cell presenting as hilar opacity	225	158
Small cell presenting as peripheral opacity	91	138
Adenocarcinoma presenting as peripheral opacity	88	56

(a) Squamous cell carcinoma, presenting as "cavitation" or "lobar collapse" is above expectation. Presenting as "hilar opacity" it is below expectation.

(b) Small cell carcinoma, presenting as "hilar opacity" is far above expectation. Presenting as "peripheral opacity" is far below expectation.

The clinical interpretation of this phenomenon is obvious in that small cell carcinoma - the most malignant type - have so often already metastasised centrally when first recognised.

(c) Adenocarcinoma, presenting as "peripheral opacity" is well above expectation.

12.4 Cell type and pre-existing respiratory disease

A cross tabulation between cell types and pre-existing respiratory disease is as follows:

Pre-existing respiratory disease	Cell type					
	Squamous	Small cell undifferentiated	Large cell undifferentiated	Adenocarcinoma	Other and not proven	Total
None	813	488	344	194	131	1,970
Chronic upper respiratory disease	22	21	9	6	3	61
Chronic bronchitis	218	78	79	47	35	457
Pulmonary disease	48	23	15	6	5	97
Other	109	56	47	19	32	263
Totals	1,210	666	494	272	206	2,848

There is between all cell types and pre-existing respiratory disease a statistically significant association ($P = < .02$). This association becomes a highly significant ($P = <.001$) when the group "small cell undifferentiated" are shown to be negatively associated with chronic bronchitis (observed 78: expected 107).

SECTION 13 : SMOKING HABITS

13.1 Smoking history

The carcinogenic properties of cigarette smoke are well documented. The analysis of the cases by smoking habits, as established where possible by the surgeon recording the information as given to him by the patient, was as follows:

Smoking history	Cases		Percentage of known	
	Males	Females	Males	Females
Never smoked	65	108	3	39
Light smoker-less than 10 per day	141	27	6	10
Moderate smoker- 10 to 19 per day	692	67	31	24
Heavy smoker - 20 to 39 per day	1,101	71	50	26
Chain smoker - 40 or more per day	149	5	7	2
Pipe and/or cigar smoker only	62	-	3	-
Not recorded	305	55	-	-
Totals	2,515	333	100	100

Three percent of the males as opposed to 39 percent of the females were non-smokers. Light smokers of either sex accounted for 6 to 10 percent of total cases. The percentage rose steeply in moderate smokers (10-19 per day) to 31 percent and 24 percent respectively.

The highest proportion of the cases by far were the heavy smokers with 50 percent of males and 26 percent of women respectively. Moderate and heavy smokers together accounted for 81 percent of males and 50 percent of females. Few New Zealand smokers, male or female, seem to comprehend how serious a health hazard is the smoking of 20 cigarettes a day.

Chain smokers made up 7 percent of the male cases and 2 percent of the female cases. These, combined with heavy smokers, accounted for 57 percent of all male lung cancers.

Three percent of the male cases smoked only pipes or cigars.

An analysis of smoking history by race showed that the Maori patients in the survey had very much the same smoking pattern as the non-Maori cases.

13.2 Smoking habits and cell type

A cross analysis of smoking habits in both sexes combined in both numbers and percentage distribution in each cell type is as follows:

Smoking habits	Cell type					Total
	Squamous	Small cell	Large cell	Adeno-carcinoma	Others	
			NUMBERS			
Never smoked	40	32	25	52	24	173
Light smoker	68	35	32	20	13	168
Moderate smoker	334	184	140	60	41	759
Heavy smoker	524	300	200	80	68	1,172
Chain smoker	79	27	29	11	8	154
Pipe and/or cigar smoker	24	17	13	5	3	62
Not known	141	71	55	44	49	360
Totals	1,210	666	494	272	206	2,848
			PERCENTAGES			
Never smoked	23	19	15	30	13	100
Light smoker	41	21	19	12	7	100
Moderate smoker	44	24	19	8	5	100
Heavy smoker	45	26	17	7	5	100
Chain smoker	51	18	19	7	5	100
Pipe and/or cigar smoker	39	27	21	8	5	100
Not known	--	--	--	--	--	--
Totals	43	24	17	10	6	100

A summary of the highly significant statistical association is:

	Observed	Expected
Squamous cell with never smoked	40	74
Adenocarcinoma with never smoked	52	16
Adenocarcinoma with heavy smoker	80	111
Other cell types with never smoked	24	12

At the level of $P < .001$ we find:

(a) Non-smokers developing squamous cell cancers - negatively associated

(b) Non-smokers developing adenocarcinoma - positively associated

(c) Non-smokers developing lung cancer of "other cell types" - for example - bronchiolar cell carcinoma, bronchial adenomas and other - positively associated

(d) Heavy smokers developing adenocarcinoma - negatively associated

SECTION 14 : METASTASES AT TIME OF DIAGNOSIS

The analyses, both sexes combined, according to whether the disease was localised or had spread to other tissues at the time of diagnosis, was as follows:

Location of metastases	Total cases	Percentage of known
None	889	32
Lymph nodes - intrapulmonary	109	4
Lymph nodes - extra thoracic	129	5
Mediastinal - lymph nodes	699	25
Chest wall	95	3
Brain	61	2
Bone	65	2
Liver	24	1
Other	74	2
Multiple metastases	651	23
Not known	52	-
Totals	2,848	100

The serious nature of lung cancer is underlined in this New Zealand sample (1957-65) when one realises that only 889 or 32 percent of the patients showed no metastases at the time of diagnosis. This indicates that it is unlikely the symptoms preceded the invasion of tissues other than the lung by any appreciable period of time. This probability must adversely affect the prospects of survival after any form of 'curative treatment'.

In 25 percent of cases, there were mediastinal metastases present at the time of diagnosis, with a further 23 percent having multiple metastases - 47 percent of the total altogether. These facts highlight the centrifugal way with which lung cancers develop and the failure to recognise them early. The fact that close to half the patients were quite beyond the hope of 'curative operative treatment' when the condition was diagnosed supports the long-held view that lung cancer from a treatment-viewpoint is a 'medical condition'. It is far easier to prevent it than curatively treat it.

SECTION 15 : TREATMENT

The following is an analysis of the intentions of treatment - that is, whether palliative or curative and the specific varieties and combinations of treatment when such were introduced.

Type of treatment		Cases	Percentage of total
None 30 percent		857	30
Palliative 39 percent	(Radiation	1,056	37
	(Surgery	23	1
	(Other	33	1
Curative 31 percent	(Pneumonectomy only	214	8
	(Lobectomy only	220	8
	(Pneumonectomy or lobectomy (and radiation	215	8
	(Radiation only HVL	71	2
	(Radiation only - super	139	5
	(Other and not known	20	--
Totals		2,848	100

Thirty percent of cases had no treatment, 39 percent had palliative treatment and 31 percent had some form of curative treatment, as detailed above.

SECTION 16 : SURVIVAL

16.1 Survival pattern

This has been determined taking December 1970 as the end point - that is, 5 years after the intake of cases into the survey closed.

The pattern revealed, whatever the form of treatment, shows how rapidly lethal is lung cancer.

Of the total of 2,848 cases covered, within the short span of 2 years, a mere 400 were alive; by 5 years only 155 of the total patients were still alive - a virtual mass extinction, or - since it is largely preventable - a mass suicide.

Survival is calculated from the date of diagnosis or treatment, whichever was the earlier. See Figure 3, on following page.

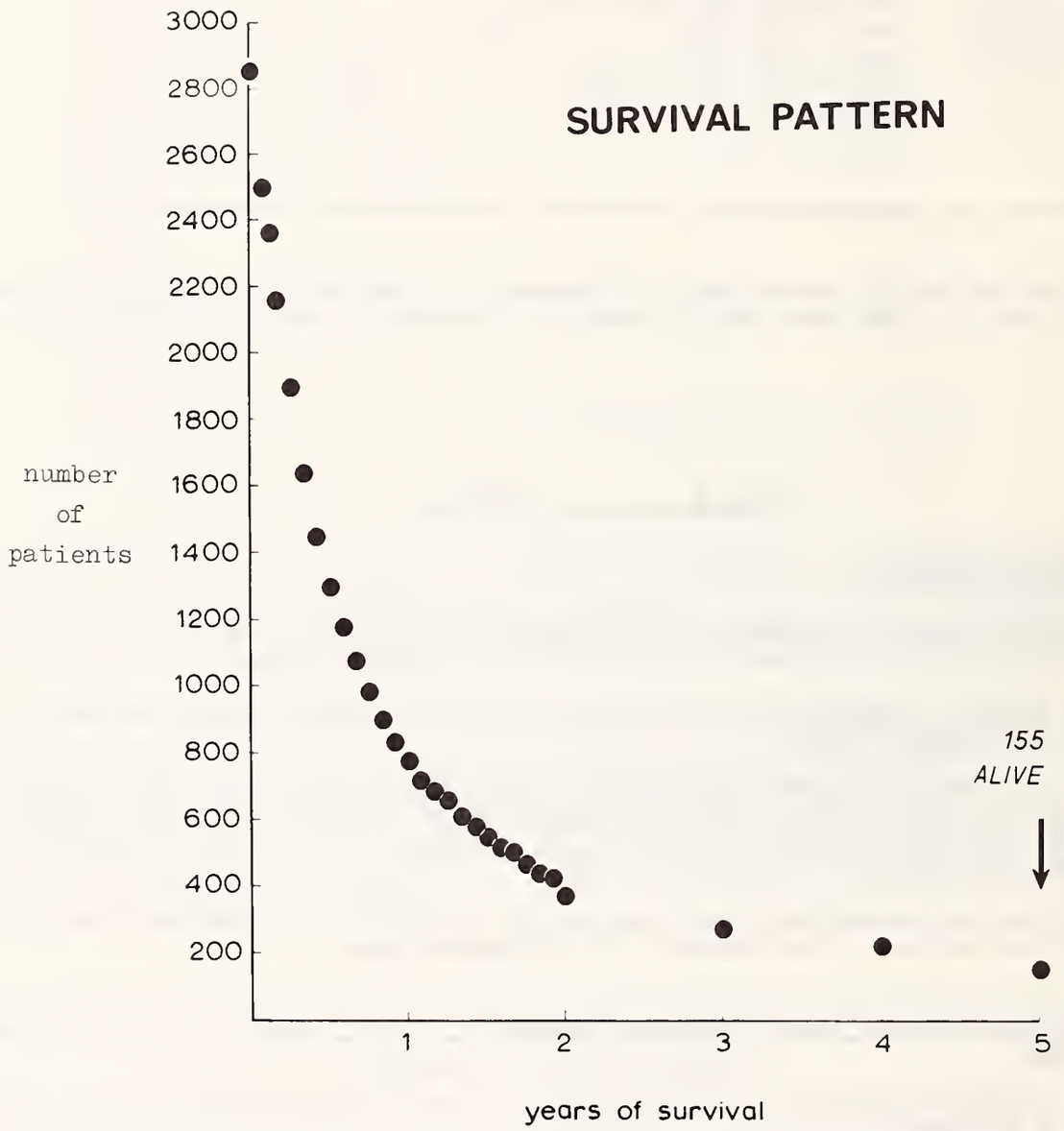
16.2 Average survival from diagnosis/treatment by the intention of the treatment by sex

The prognosis according to the intention or nature of the treatment given is as follows:

Intention or nature of treatment	Cases		Average survival in months	
	Males	Females	Males	Females
Palliative and none	1,720	249	6.3	6.6
Curative	788	84	28.0	32.5

FIGURE 3

The survival pattern of all cases in this survey showing the incredibly steep mortality in the first two years after diagnosis, when, of 2,848 patients, a mere 400 were still alive. By five years only 155 patients remained alive



Those cases regarded as having 'curative treatment' lived on the average 30 months, compared with the average survival of 6 months in those given 'palliative treatment' or 'none' - which are virtually synonymous.

The female advantage in survival is noteworthy. This advantage applies to cancers of some other sites and is not unique to the lung.

This figure of 30 months was the average period of survival up until the survey closed in 1970, and it is known there were 145 patients (127 males and 18 females) who were treated 'curatively' still alive five+ years after the last possible date for treatment.

16.3 Survival from diagnosis/treatment by anatomical site

The average survival time for those who died, according to whether the disease was located in the right lung, the left lung or in both lungs was as follows:

Location of disease	Cases	Survival in months before death
Right lung	1,443	12.4
Left lung	1,290	14.3
Both lungs	46	6.7
Not known	69	-

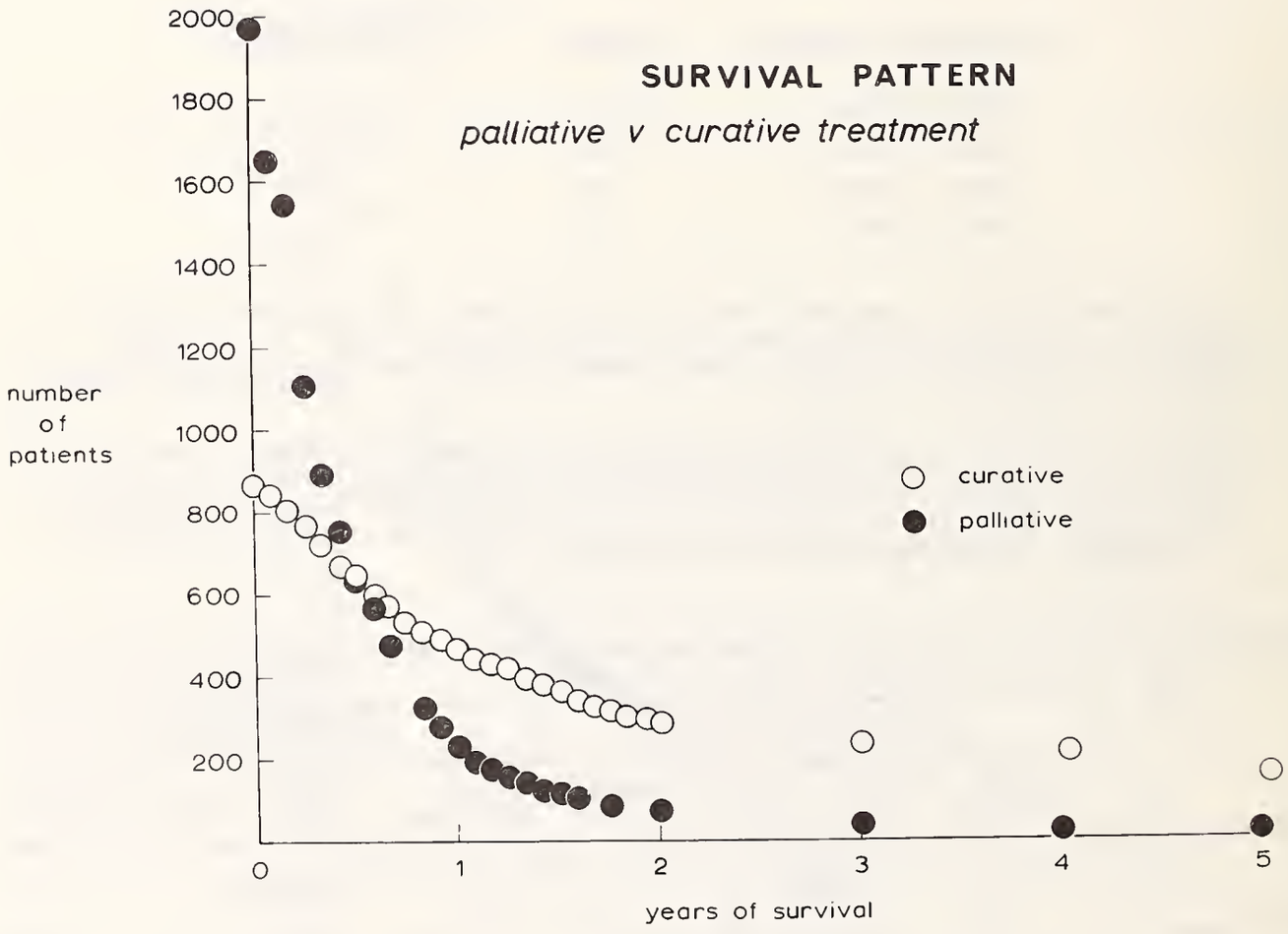
For prognosis for those who died with the disease in the left lung (14.3 months) is slightly better than that for the right lung (12.4 months). When the disease is present in both lungs at time of diagnosis the average survival time is 6.7 months.

In 46 of the total of 2,848 patients in the survey, the lesion was bilateral and the detail was not recorded in 69 cases, giving a total of 2,825 known sites. An analysis of the 2,825 affected lungs according to the precise site of the lesion, where this was known, and the average time of survival in months presents as follows:

	RIGHT LUNG				LEFT LUNG			
	Anatomical site				Anatomical site			
	Main bronchus	Upper lobe	Middle lobe	Lower lobe	Main bronchus	Upper lobe	Lingula	Lower lobe
	Central				Central			
Total lungs	246	411	82	236	209	395	25	249
Survival in months from treatment/ diagnosis	6.5	12.6	6.7	13.6	6.8	14.0	10.3	13.2
	Peripheral				Peripheral			
Total lungs	-	260	54	145	-	265	33	130
Survival in months from treatment/ diagnosis	-	17.1	12.3	15.8	-	19.5	23.2	14.9

FIGURE 4

Diagram comparing the slope of the curve over a five-year period in patients who had palliative or no treatment compared with those who had curative (surgical) treatment



Peripheral lesions had a longer survival period than central lesions, the most favoured sites for survival being lingula of the upper lobe with an average of 23 months followed by left upper lobe minus the lingula with an average survival of 19 months.

This finding confirms the finding from another study (Borrie, 1965)[1] that the upper lobe tumours treated surgically appear to have more favourable prognosis than those with tumours in other areas of the lung.

16.4 Survival from diagnosis/treatment by cell type

The average survival periods in months until death intervened or up to the end of the survey in December 1970 was examined by cell type when such was known and where the number of cases available for an analysis was of adequate size. The results were:

	Cell type				
	Squamous	Small cell undifferentiated	Large cell undifferentiated	Adeno-carcinoma	Broncheolar carcinoma
			MALES		
Total cases	1,138	575	439	202	22
Average survival in months from treatment/diagnosis	16.6	7.8	11.9	12.8	14.8
			FEMALES		
Total cases	72	91	55	70	13
Average survival in months from treatment/diagnosis	12.5	8.3	9.5	16.2	13.7

In males the most favourable prognosis appears for the squamous cell type whereas in females, adenocarcinoma of the lung showed the highest average figure at approximately the same level. It needs to be noted, however, that this comparison does not take into consideration possible differences in the pattern of age and stage of disease at diagnosis. Other studies have shown that, when these factors are taken into account, adenocarcinomas in both males and females progress less rapidly towards a fatal termination than do the squamous cell types. The average survival for small cell carcinomas was 7.8 months for males and 8.3 months for females.

Once the tumour is disseminated, then the fatal impact is swift and inevitable. In this particular series of 2,848 cases, 70 percent of tumours were widely disseminated when first diagnosed.

[1] Borrie, J. (1965). Lung Cancer; Surgery and Survival. New York, Appleton-Century-Crofts, pp 166 and 192

SURVIVAL BY CELL TYPE

Curative treatments only

Period of survival after operation	Number of cases						Percentage of cases					
	Squamous Cell	Small Cell	Large Cell	Adeno-carcinoma	Bronchiolar	Other and Not Known	Squamous Cell	Small Cell	Large Cell	Adeno-carcinoma	Bronchiolar	other and no known
Total cases	489	145	122	79	15	22	100.0	100.0	100.0	100.0	100.0	100.0
Alive at end of :												
1 year	275	44	60	47	11	17	56.2	30.3	49.2	59.5	73.3	77.3
2 years	177	23	38	33	5	15	36.2	15.9	31.1	41.8	33.3	68.2
3 years	141	15	30	27	4	13	28.8	10.3	24.6	34.2	26.7	59.1
4 years	122	10	26	25	3	13	24.9	6.9	21.3	31.6	20.0	59.1
5 years	88	9	20	16	2	10	18.0	6.2	16.4	20.2	13.3	45.4
6 years	58	8	15	11	2	9	11.9	5.5	12.3	13.9	13.3	40.9
7 years	43	8	7	5	-	7	8.8	5.5	5.7	6.3	-	31.8
8 years	31	5	5	5	-	3	6.3	3.4	4.1	6.3	-	13.6
9 years	20	4	4	4	-	2	4.1	2.8	3.3	5.1	-	9.1
10 years	13	-	2	-	-	1	2.6	-	1.6	-	-	4.5

The foregoing table sets down in numbers and percentages the survivors at the end of each yearly interval in the different cell types. The analysis covers the 872 cases where surgical treatment aimed at a cure of the disease was undergone.

The average length of survival of these cases up until the survey closed was only 28.5 months. However, there were a lucky few in each cell type who remained alive at least five and some even ten years after the date of the treatment.

A summary of the table shows:

Survival after 5 years

	Squamous cell	Small cell	Large cell	Adeno-carcinoma	Bronchiolar
Numbers surviving	88	9	20	16	2
Percentages surviving	18.0	6.2	16.4	20.2	13.3

Survival after 10 years

Numbers surviving	13	Nil	2	Nil	Nil
Percentages surviving	2.6	Nil	1.6	Nil	Nil

When analysed by cell type against central or peripheral sites of the tumour, the numbers of cases alive were:

	Squamous cell	Small cell	Large cell	Adeno-carcinoma	Bronchiolar
			Central tumours		
Numbers surviving -					
5 years	46	4	7	3	Nil
10 years	7	1	1	Nil	Nil
			Peripheral tumours		
Numbers surviving -					
5 years	36	5	13	8	2
10 years	6	3	1	1	Nil

16.5 Survival from diagnosis/treatment by pre-existing respiratory disease

Examination of survival by selected pre-existing lung conditions produced the following figures:

	Pre-existing respiratory disease						
	None	Chronic upper respir-atory	Chronic bronch-itis	Pulmonary tubercul-osis	Bronchiect-asis	Pneumoc-oniosis	Other
Total cases	1,970	61	457	97	11	14	139
Average survival in months from diagnosis/treatment	13.4	12.6	12.4	15.3	18.8	8.1	14.0

The differences shown cannot be taken as indicating that persons with a pre-existing respiratory condition have a greater or lesser period of survival than those without such a history.

16.6 Survival according to duration of symptoms before diagnosis/treatment, in patients for whom all data were known

	Duration of symptoms				
	0-3 months	4-6 months	7-12 months	13-24 months	Over 24 months
Number of cases	1,493	605	346	115	30
Average survival in months from diagnosis/treatment	11.2	14.2	14.5	13.1	14.2

Lung cancers have one recognised propensity - they develop and spread rapidly. It would appear that the differences recorded above reflect no more than variation in the rate of growth of the malignant cells and their power to infiltrate and spread. However, it is emphasised that the above figures do not give full weight to long-term survivors, since the survival 'end-point' was taken as five years after the study closed.

SECTION 17 : CAUSE OF DEATH

An examination of the cases according to the cause of death produced the following:

NOTE: 155 patients were known to be still alive more than 5 years after end of survey

Deaths from -	Cases	Percentage of known
Malignant disease	2,512	94
Intercurrent disease with malignant disease present	99	4
Intercurrent disease or external cause without malignant disease present	49	2
Unascertained cause of death	33	--
Total cases	2,693	100

CONCLUSIONS AND RECOMMENDATIONS

PART A : DEATHS AND CASES REGISTERED

- Male lung cancer mortality in New Zealand increased at a constant rate between 1961 and 1971. As yet, there is no obvious indication that the pace of the increase is slowing down, as has been the case in a number of other countries.

  Projection of the present New Zealand trend to the year 1975 points to a yearly total of around 900 male lung cancer deaths or one in every three of the estimated total of male deaths from cancer of all sites.

- Female rates in New Zealand have increased at a faster pace over recent years. This trend is world-wide.

  A projection to 1975 indicates that a figure of around 200 female lung cancer deaths is likely to be recorded, a proportion of one in ten of the estimated total of female deaths from cancer of all sites.

- The more rapid increase in lung cancer in females is lowering the male-to-female ratio. At present the ratio stands at 5.3 : 1 but by 1975 it is likely to have dropped to 4.5 : 1.

- The increase in lung cancer over the last ten years has been at all ages in both sexes but the rates at ages under 60 years have risen more rapidly than those at older ages.

- A causative relationship between cigarette smoking and lung cancer as well as several other diseases is accepted as being both scientifically and statistically established. The almost complete lack of information about the smoking habits of men and women and the changes in these habits which are clearly taking place, is a handicap to all concerned with our most serious environmental health problem. It is strongly recommended that

  (a) population surveys of cigarette smoking habits be carried out at regular intervals;

  (b) a question as to current cigarette smoking become a feature in the five-yearly Census of Population. The advantage of this medium is that it would permit of cross tabulation with demographic and socio-economic items.

- In many other countries, the United States and the United Kingdom are singled out in particular, regular smoking surveys of samples of the population are carried out. The information from these surveys is that there is a downward trend in the smoking of cigarettes among men and an upward trend among women. There are very convincing impressions that something similar is happening in New Zealand in that there is less smoking among men, especially those at middle ages, and more among both girls and women of all ages. If these impressions are true, then eventually a levelling-off in lung cancer among men can be anticipated, while more women will develop the disease and die from it.

- Lung cancer is very much more common in both Maori men and women than in the rest of the population. The Maori woman is probably at greater risk of both dying from or contracting lung cancer than any other female group in the world. More than one causal or underlying factor may be involved, but there is evidence from small surveys and from

observation that Maori girls and women are very heavy cigarette smokers. Heavy cigarette smoking is shown to be more common in the lower socio-economic groups of all countries. It is in this group in New Zealand that Maoris figure disproportionately and the need is to make comparisons with similar non-Maori groups in our society.

- The high lung cancer incidence with heavy cigarette smoking undoubtedly the dominant causal factor in the Maori has wider implications in respect of overall Maori health standards, by reason that lung cancer is only a part of the total of tobacco induced morbidity and mortality. Unless Maori smoking habits change it could be that the anticipated drop in Maori death rates in middle age to levels closer to those of the rest of the population may never appear. Good health in middle age and high life expectancy depends very much today on personal choice.

- New Zealand is well placed to make a valuable contribution to the world's knowledge of lung cancer, but as yet no researcher has taken up the challenge. It is strongly recommended than an epidemiologist be funded to undertake applied research into bronchogenic carcinoma in this country. The research should embrace the smoking habits of New Zealanders and the qualities of the tobacco used in New Zealand cigarettes.

- High levels of air pollution associated with urbanisation are thought to raise the chances of incurring lung cancer, especially in cigarette smokers. Again, urban dwellers have been found by sample surveys to be heavier smokers than rural dwellers in overseas countries. No relevant smoking data are available for New Zealand and significant industrial air pollution does not exist but a straight urban-rural comparison in lung cancer death rates does not disclose a higher risk of contracting lung cancer in New Zealand urban dwellers as opposed to rural dwellers. Increased urbanisation in New Zealand over many years has not contributed, it would seem, to the rapid rise in lung cancer deaths.

- The U.K. immigrant to New Zealand is at greater risk, 20 percent in men and 78 percent in women, of contracting lung cancer. The difference is greater in those who came to New Zealand at older ages. These findings were first promulgated by Dr. D.P. Eastcott in 1956. This analysis for later years shows that there has been some reduction in the excess risk of the U.K. immigrant.

- Figures of deaths from lung cancer understate the true incidence or occurrence of the condition by around 10 percent. The reason is that a small percentage of cases are successfully treated whilst in others the disease is arrested for a sufficiently long period to allow of death from some other cause. The total of lung cancer cases actually occurring in the community including those diagnosed at post-mortem examination and never treated, is currently estimated to be in the vicinity of one thousand.

PART B : CLINICAL AND EPIDEMIOLOGY SURVEY

- Ninety-one percent of the patients in this survey were proven to have lung cancer by the finding of neoplastic cells

- Regarding age : Few persons developed lung cancer under the age of 40. Some 38 percent came in the 60-69 age group, and 27 percent in the 50-59 age group. With therefore 65 percent contracting lung cancer before or at the age of retirement, it is very easy to understand why superannuation schemes for smokers are such viable financial propositions, especially when viewed in relation to the average survival time after discovery of lung cancer.

- Regarding race : Ninety-seven percent of male patients with their race recorded were non-Maori, as against only 3 percent Maori; but in females the comparative proportions were 91 percent non-Maori and 9 percent Maori. These findings support those of Part A - Deaths that there is quite a disproportionate occurrence of lung cancer in Maori women, and in the study here reported the cases were all histologically proven.

- Regarding occupation : In the occupational groups, administrators were more commonly affected, totalling 16 percent lung cancer representation as opposed to 10.4 percent in the 45 years or over working population group. Transport workers were also at greater risk.

- Regarding prior respiratory disease : With over 1 in 4 of the patients having prior respiratory disease - especially chronic bronchitis - indications are that such persons are at relatively high risk of contracting a frank lung cancer.

- Regarding previous history of cancer : In 91 percent of cases there was no recorded history of cancer either in the patient or his or her blood relatives.

- Regarding symptoms : Cough and blood spitting were the most common symptoms when the tumour was at its most common site, that is centrally placed in the lung, and anatomically at places where inhaled tobacco smoke is most concentrated; namely in the right and left main bronchi, or at the origin of the secondary bronchi of the five lung lobes.

  Chest pain - a symptom of pleural involvement - was most common in peripheral lung cancers.

- Regarding clinical presentation : Seventy-two percent of the cases presented with blocked bronchus syndrome or some variant of it. As in a parallel series of biopsy-proven cases, lung cancer was found to be the most common finding from 'chance chest films' such as mass x-ray surveys, the value of this examination in the 'smoking 45 or over age group' is obvious.

  Six percent of cases were discovered by signs of distal spread.

  In 13 percent the exact diagnosis was established only at autopsy; yet the cancer was already there, either symptomless or masquerading as some other disease.

- Regarding duration of symptoms : Fifty-one percent of those with symptoms presented within three months, and 22 percent between 4-6 months.

- Regarding early detection : It is recommended that patients over 45 with 'above normal susceptibility' should - in their own interests - be alert to any type of respiratory symptom, and have annual chest check films.

  Chest films show lung cancers masquerading as central and peripheral lung shadows, collapsed lobes, pneumonia, 'virus' pneumonia, or lung abscess. Thus early sputum cytology and bronchoscopic check are essential for obtaining early diagnosis and treatment in patients with these x-ray states.

  But even a 'normal chest film' is not total security in a smoking patient with respiratory symptoms. He too needs bronchoscopy to eliminate central tumours that may be present - but not large enough to alter bronchial mechanics and give x-ray changes.

- Regarding site in lung : Lung cancers develop twice as common centrally as peripherally, that is, in the portions of the bronchial tree where inhaled tobacco smoke is most concentrated.

- Regarding cell types : Adenocarcinoma - which is less smoking-linked - contributed 23 percent of females as against 8 percent in males.

  In cell type by race, the smokers' cancer - squamous cell in type - was more common in the Maori of both sexes than non-Maori. Adenocarcinoma is markedly low in Maoris of both sexes.

  Squamous cell carcinomas presenting as cavitation = lung abscess or as lobar collapse were found at levels above expectation. In other words - x-ray findings of lung abscess or lobar collapse in the 45+ smoking age group must be quickly checked by sputum cytology and bronchoscopy in order to exclude the high likelihood of lung cancer as the cause.

  Small cell lung cancers - which notoriously spread rapidly - show shadows at the root of the lung more often than expected. This very fact is linked with their sinister prognosis which represents early spread. In this series the average survival from diagnosis of small cell lung cancer was 7.8 months for males and 8.3 months for females.

  Adenocarcinoma presenting as round tumours towards the edge of the lung are statistically above expectation.

  All lung cancer cell types were significantly associated with pre-existing respiratory disease.

  Tumours known to be associated with smoking occurred in 91 percent of the New Zealand males as opposed to 71 percent of the females studied. In the squamous group, males contributed 49 percent of lung cancers; females 23 percent. The undifferentiated cell types were almost equally common in male and female cases.

- Regarding smoking habits : In this study only 3 percent of males as opposed to 39 percent of females were non-smokers.

  Moderate smokers - (10-19 per day) and heavy smokers (20-39 per day) together accounted for 81 percent of males and 50 percent of females.

  The chances of a non-smoker developing squamous cell carcinoma are slim; however, they can develop adenocarcinoma, though at nothing like the rate moderate and heavy smokers develop lung cancer.

- Regarding survival : Thirty percent had no treatment, 39 percent had palliative treatment to ease symptoms, and 31 percent some form of curative treatment. Those cases regarded as having curative treatment lived on an average 30 months as compared with the average survival of 6 months for those with palliative treatment or none. There is a slight advantage in having the disease in the left rather than the right lung, but when present in both, the average survival was 6.7 months.

  The serious nature of lung cancer is underlined in this New Zealand sample (1957-65) when one realises that only 32 percent of the patients showed no metastases at the time of diagnosis. This 'spread of disease' when first recognised, adversely affects prognosis. Indeed 25 percent had spread into the mediastinal tissue around the heart when first seen, and 23 percent had multiple metastases through out the body - totalling 48 percent of all cases. Once the tumour is disseminated the fatal impact is swift and inevitable.

- Regarding prevention : With almost 70 percent of cases quite beyond the hope of curative, operative treatment when first diagnosed, lung cancer is far better prevented than treated.

  Of the total of 2,848 cases surveyed, within 2 years a mere 400 persons were alive: by 5 years only 155 remained alive - a virtual mass extinction, or, since the disease is preventable - a mass suicide.

  No one wishes to perish by 'Auto-de-Fé', yet cigarette smoking produces for the majority a like result with as little happiness; and this on men and women who could still contribute usefully to the community had they quenched their cigarette fires, or better still, never lit them.

  Though fire is a good servant, it is a bad master, and at its diabolical worst - from a health and survival viewpoint - when linked with cigarette smoking.

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TABLE 1 : DEATHS FROM LUNG CANCER: NUMBERS AND RATES, 1926-71

Year	MALES			FEMALES		
	Number	Death rate per 100,000 of population	Standardised mortality ratio (Base years 1950-52=100)	Number	Death rate per 100,000 of population	Standardised mortality ratio (Base years 1950-52=100)
1926	9	1.3	7	10	1.5	45
1927	10	1.4	8	5	0.7	22
1928	14	2.0	11	9	1.3	41
1929	12	1.7	9	4	0.6	20
1930	31	4.1	24	6	0.8	30
1931	29	3.8	22	13	1.8	60
1932	32	4.1	23	14	1.9	64
1933	31	4.0	23	12	1.6	55
1934	21	2.7	15	11	1.4	48
1935	28	3.5	19	9	1.2	40
1936	36	4.5	23	18	2.3	72
1937	31	3.8	20	11	1.4	42
1938	56	6.9	34	16	2.0	62
1939	50	6.0	30	17	2.1	63
1940	47	5.7	27	12	1.5	43
1941	51	6.3	29	17	2.1	59
1942	74	9.2	41	16	1.9	60
1943	85	10.8	48	18	2.1	60
1944	92	11.5	50	21	2.5	76
1945	104	12.6	54	26	3.0	81
1946	128	14.5	65	20	2.3	62
1947	122	13.5	61	31	3.4	94
1948	153	16.6	75	23	2.5	68
1949	167	17.7	81	26	2.8	72
1950	174	18.0	86	29	3.0	82
1951	206	21.1	100	38	3.9	107
1952	242	24.1	114	41	4.1	111
1953	243	23.6	113	37	3.6	95
1954	263	25.0	121	31	3.0	79
1955	299	27.8	135	37	3.5	95
1956	314	28.6	140	59	5.4	140
1957	357	31.8	156	46	4.1	110
1958	338	29.4	146	56	4.9	130
1959	363	30.9	154	56	4.8	127
1960	342	28.6	144	63	5.3	140
1961	395	32.4	164	75	6.2	163
1962	438	35.0	179	61	4.9	130
1963	464	36.4	187	79	6.3	167
1964	476	36.6	189	80	6.2	163
1965	486	36.8	190	69	5.3	140
1966	536	39.8	210	73	5.5	150
1967	509	37.2	192	93	6.8	184
1968	627	45.5	232	102	7.4	198
1969	644	46.3	236	117	8.4	221
1970	680	48.5	248	149	10.6	278
1971	678	47.4	240	135	9.4	247

TABLE 2 : DEATHS FROM LUNG CANCER: NUMBERS AT AGES, 1926-71 A. MALES BY AGE GROUPS

Year	Age groups												All ages
	Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+	
1926	-	-	-	-	1	1	1	1	3	2	-	-	9
1927	-	-	-	1	-	2	-	1	2	-	3	1	10
1928	1	-	-	-	-	1	3	1	2	3	2	1	14
1929	1	1	-	1	-	1	1	2	4	-	-	1	12
1930	1	2	-	2	2	7	2	4	4	6	1	-	31
1931	2	-	-	1	1	5	5	5	4	4	2	-	29
1932	4	-	1	1	1	2	5	6	3	7	2	-	32
1933	1	-	-	-	1	2	8	5	5	4	3	2	31
1934	-	-	-	1	1	4	3	6	2	3	-	1	21
1935	-	-	1	1	1	4	3	5	4	4	2	3	28
1936	-	-	-	-	1	1	10	11	7	3	2	1	36
1937	-	-	-	-	1	4	4	7	7	5	-	3	31
1938	-	-	-	1	2	1	8	5	19	6	8	6	56
1939	-	-	1	3	2	5	6	10	8	6	5	4	50
1940	-	-	-	3	2	4	6	5	10	10	5	2	47
1941	-	-	-	1	3	2	9	11	9	10	3	3	51
1942	-	-	1	-	4	3	11	13	17	13	8	4	74
1943	1	-	-	2	2	3	9	12	21	21	8	6	85
1944	-	-	-	3	4	7	8	11	25	23	6	5	92
1945	-	1	2	1	3	6	7	19	29	20	9	7	104
1946	1	-	1	1	5	12	10	20	23	30	17	8	128
1947	-	-	1	3	4	4	12	27	24	24	15	8	122
1948	-	-	2	2	4	8	13	17	36	37	21	13	153
1949	-	-	-	-	3	17	22	27	27	37	23	11	167
1950	-	-	-	3	4	11	18	22	28	42	25	21	174
1951	-	-	-	1	5	16	23	33	38	39	30	21	206
1952	-	1	-	4	5	12	22	39	38	43	47	31	242
1953	-	1	-	2	6	19	18	47	39	52	32	27	243
1954	-	-	1	1	5	14	22	36	56	52	46	30	263
1955	-	1	1	1	5	19	27	45	55	61	42	42	299
1956	-	-	2	1	4	12	28	40	50	62	65	50	314
1957	-	2	1	1	8	23	31	52	60	63	65	51	357
1958	1	-	1	1	5	17	32	36	64	72	46	63	338
1959	1	1	1	-	7	17	30	44	62	74	55	71	363
1960	-	-	1	1	4	25	23	41	55	69	57	66	342
1961	-	-	2	2	4	21	30	50	84	69	56	77	395
1962	-	1	1	7	6	18	27	60	71	86	76	85	438
1963	-	1	-	5	8	23	33	58	93	77	63	103	464
1964	2	1	1	9	5	25	43	56	97	79	71	87	476
1965	1	1	1	6	17	15	30	58	89	102	72	94	486
1966	1	-	-	2	8	22	43	81	97	103	82	97	536
1967	-	-	1	2	4	19	40	63	99	82	86	113	509
1968	-	-	1	5	13	17	57	78	119	111	96	130	627
1969	-	1	-	3	11	27	52	67	136	120	106	121	644
1970	-	-	1	3	15	30	40	81	123	153	107	127	680
1971	-	1	2	3	12	27	44	86	116	149	116	122	678

TABLE 2 : DEATHS FROM LUNG CANCER: NUMBERS AT AGES, 1926-71 B. FEMALES BY AGE GROUPS

Year	Age groups												All ages
	Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+	
1926	-	-	-	-	1	2	2	2	-	1	2	-	10
1927	-	-	-	1	-	1	1	1	-	1	-	-	5
1928	-	-	2	1	-	-	-	2	1	1	2	-	9
1929	-	1	-	1	-	-	-	-	-	-	1	1	4
1930	1	1	-	-	-	-	-	1	2	-	1	-	6
1931	-	-	2	-	1	-	1	2	3	2	2	-	13
1932	-	-	-	1	-	-	2	4	1	3	2	1	14
1933	-	-	-	1	1	1	2	1	1	1	2	2	12
1934	-	-	-	-	1	2	1	2	3	1	1	-	11
1935	-	-	1	-	1	4	-	-	2	1	-	-	9
1936	-	-	-	-	2	1	4	2	4	4	1	-	18
1937	-	-	-	1	-	2	-	1	2	2	3	-	11
1938	1	-	-	-	1	1	1	4	2	1	3	2	16
1939	-	1	1	1	-	1	-	5	3	3	2	-	17
1940	1	-	-	-	1	1	1	1	1	2	2	2	12
1941	1	-	1	-	-	1	3	1	2	4	2	2	17
1942	-	-	-	-	-	1	1	2	5	1	4	2	16
1943	1	-	-	2	3	1	1	3	3	1	1	2	18
1944	-	1	-	-	1	2	2	2	5	4	2	2	21
1945	-	-	-	1	2	-	2	6	4	3	4	4	26
1946	-	-	-	1	1	2	1	3	2	3	3	4	20
1947	-	-	-	-	1	2	3	4	6	6	4	5	31
1948	-	-	1	2	1	3	1	2	1	9	1	2	23
1949	-	-	-	-	1	1	3	2	5	6	6	2	26
1950	-	-	-	1	2	-	2	4	5	6	2	7	29
1951	-	1	1	1	2	-	2	5	4	7	1	14	38
1952	-	-	-	-	-	4	7	8	3	6	9	4	41
1953	-	-	-	1	2	2	2	9	4	2	8	7	37
1954	-	-	-	-	-	3	1	4	5	4	5	9	31
1955	-	-	-	1	2	4	1	3	2	8	5	11	37
1956	-	-	-	1	1	4	7	7	6	6	10	17	59
1957	-	-	-	-	-	3	2	3	10	5	5	18	46
1958	-	-	-	1	1	2	5	5	9	11	10	12	56
1959	1	-	1	-	-	4	2	7	5	8	11	17	56
1960	-	-	-	1	5	1	7	5	9	13	10	12	63
1961	-	-	-	3	2	5	6	10	11	11	11	16	75
1962	-	-	1	-	-	7	7	5	10	9	9	13	61
1963	-	-	1	2	1	7	7	9	13	11	15	13	79
1964	-	-	-	-	2	5	8	10	12	19	12	12	80
1965	1	1	-	1	1	7	9	9	9	12	6	13	69
1966	-	-	1	2	2	6	9	4	12	15	10	12	73
1967	-	1	-	1	5	7	12	16	7	14	13	17	93
1968	-	-	-	-	5	3	13	21	6	15	20	19	102
1969	-	-	1	3	5	3	15	21	22	15	14	18	117
1970	-	2	1	2	3	5	15	21	29	19	21	31	149
1971	-	-	-	3	8	7	9	29	17	24	15	23	135

TABLE 3 : DEATHS FROM LUNG CANCER: RATES AT AGES, 1934-71

Average annual rates in quinquennia centred on the censuses of 1936, 1945, 1951, 1956, 1961, 1966 and estimates for 1969/71

Rates per 100,000

5-year period and latest 3-year period	Age groups												All ages
	Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+	
MALES													
1934-38	-	-	0.3	1.1	2.7	5.9	11.9	16.2	25.4	18.7	17.5	19.2	4.3
1943-47	0.1	--	1.3	3.3	6.5	13.0	22.0	41.6	61.2	72.6	54.2	35.6	12.8
1949-53	-	0.5	-	3.2	7.1	26.1	42.2	85.3	89,2	124.5	120.9	91.0	21.2
1954-58	--	0.8	1.5	1.4	7.7	25.6	50.4	89.6	158.9	187.2	194.5	152.1	28.7
1959-63	--	0.8	1.2	3.7	8.1	29.2	44.5	94.7	175.6	238.9	236.8	235.4	33.0
1964-68	1.2	0.5	1.0	5.7	11.6	27.1	61.9	109.4	203.8	261.6	332.3	303.0	39.2
1969-71	-	0.7	1.2	3.9	15.2	35.6	66.5	120.8	228.8	336.4	397.6	382.2	47.3
FEMALES													
1934-38	--	-	0.4	0.4	2.0	4.2	2.7	4.7	9.1	8.3	11.5	2.7	1.7
1943-47	--	0.3	-	1.3	3.0	3.0	4.0	8.4	10.2	10.3	13.6	15.6	2.7
1949-53	-	0.3	0.3	0.9	2.2	2.6	6.6	13.0	10.4	14.9	18.6	23.7	3.5
1954-58	-	-	-	0.8	1.1	5.1	6.1	9.3	15.5	17.9	22.8	35.6	4.2
1959-63	--	-	0.8	1.5	2.2	6.8	9.4	14.0	21.5	26.4	34.4	31.4	5.6
1964-68	--	0.5	0.3	1.0	3.8	7.6	14.7	19.9	18.4	34.9	35.8	28.8	6.3
1969-71	-	0.7	0.8	3.6	6.8	6.4	18.4	35.7	39.8	41.5	45.2	44.5	9.5

-- = less than 0.1

TABLE 4 : NEW CASES OF LUNG CANCER REGISTERED : NUMBERS AT AGES, 1948-70 A. MALES BY AGE GROUPS

New cases registered with the National Cancer Registry

Year	Age groups																		All ages
	0-4	5-9	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60-	65-	70-	75-	80-	85+	
1948	-	-	-	-	-	-	1	1	7	13	17	24	28	24	11	7	2	1	136
1949	-	-	-	-	-	-	1	1	2	13	18	22	29	32	12	6	1	-	137
1950	-	-	-	-	-	-	-	-	5	15	19	27	19	36	18	10	5	1	155
1951	-	-	-	-	-	-	-	1	4	16	25	29	31	29	22	9	5	1	172
1952	-	-	-	-	-	1	1	2	6	12	20	40	29	38	40	11	3	-	203
1953	-	-	-	-	-	1	2	2	6	19	23	44	38	54	30	19	8	1	247
1954	-	-	-	-	-	-	1	-	5	19	28	39	56	51	41	18	3	2	263
1955	-	-	-	-	-	-	-	1	6	11	27	39	56	57	43	17	8	3	268
1956	1	-	-	-	-	1	2	2	5	20	24	48	53	58	56	31	7	2	310
1957	-	-	-	-	2	2	1	2	7	30	38	52	61	57	58	31	7	-	348
1958	-	-	-	-	-	-	3	1	9	25	39	49	68	70	44	33	9	3	353
1959	-	-	-	-	-	1	-	1	7	22	24	57	57	69	61	33	16	3	351
1960	-	-	-	-	-	1	3	2	5	23	34	52	64	75	53	37	16	10	375
1961	-	-	-	1	-	-	1	5	8	23	48	64	77	77	61	39	15	10	429
1962	-	-	-	-	-	-	1	8	9	20	36	65	82	92	81	43	27	5	469
1963	1	-	-	-	-	3	1	9	7	25	38	71	107	77	52	52	24	11	478
1964	-	1	-	-	1	2	-	8	12	25	45	75	100	86	67	48	20	12	502
1965	-	-	-	-	-	1	-	4	11	21	48	81	113	105	80	53	21	10	548
1966	-	1	-	-	-	-	1	3	9	25	69	96	119	100	93	54	29	9	608
1967	-	-	-	-	-	-	2	4	15	19	53	86	99	114	86	68	23	12	581
1968	-	-	-	-	-	-	1	6	10	31	62	90	156	119	120	66	32	17	710
1969	-	-	-	-	1	-	1	6	12	39	58	95	124	144	99	66	21	6	672
1970	-	-	-	-	-	1	-	2	14	29	54	87	155	158	112	57	37	11	717

TABLE 4 : NEW CASES OF LUNG CANCER REGISTERED : NUMBERS AT AGES, 1948-70 B. FEMALES BY AGE GROUPS

New cases registered with the National Cancer Registry

Year	Age groups																	All ages
	0-4	5-9	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60-	65-	70-	75-	80-	85+	
1948	-	-	-	-	-	1	-	2	-	-	3	2	1	9	1	1	-	-	20
1949	-	-	-	-	-	-	-	1	1	-	3	-	2	6	3	-	-	-	16
1950	-	-	-	-	-	-	1	-	-	-	2	6	4	1	2	2	1	1	20
1951	-	-	-	-	-	1	-	1	2	2	1	4	3	9	3	1	2	-	29
1952	-	-	-	-	-	-	-	-	1	-	6	6	4	3	3	3	1	1	28
1953	-	-	-	-	-	-	-	1	3	3	3	7	-	3	6	5	-	-	31
1954	-	-	-	-	-	1	-	-	2	1	3	3	6	2	4	3	-	-	25
1955	-	-	-	-	-	-	-	2	1	9	2	3	4	6	7	10	2	-	46
1956	-	-	-	-	-	-	-	2	3	4	8	7	6	6	4	5	2	2	49
1957	-	-	-	-	-	-	-	1	2	3	1	9	7	5	7	6	2	-	43
1958	-	-	-	-	1	-	-	-	1	4	4	6	5	9	8	8	3	-	49
1959	-	-	-	-	-	-	1	2	3	5	4	7	4	5	5	9	2	-	47
1960	-	1	-	-	-	-	-	4	4	2	4	4	9	13	6	9	1	-	57
1961	-	-	-	-	-	-	-	2	2	10	8	13	10	9	9	6	3	-	72
1962	-	-	-	-	-	-	2	2	-	6	9	5	12	14	9	6	3	2	70
1963	-	-	-	-	-	-	-	2	1	6	7	10	14	10	17	6	-	4	77
1964	-	-	-	-	-	1	-	1	2	11	12	8	15	17	12	5	1	2	87
1965	-	-	-	-	-	-	-	2	3	5	11	10	16	12	8	5	1	4	77
1966	-	-	-	1	-	1	1	1	5	7	16	20	14	21	12	9	4	1	113
1967	-	-	-	1	-	-	-	1	4	6	19	11	4	18	15	6	8	2	95
1968	-	-	-	-	-	1	-	1	4	2	17	27	17	16	16	12	7	1	121
1969	-	-	-	-	-	1	1	3	9	8	19	17	20	14	12	11	6	5	126
1970	-	-	-	-	-	1	-	2	-	9	16	25	25	21	17	19	4	6	145

TABLE 5 : NEW CASES OF LUNG CANCER REGISTERED : RATES AT AGES, 1948-70

Cases registered with the National Cancer Registry

Rates per 100,000

Year	Age groups						All ages
	Under 45	45-54	55-64	65-74	75-84	85 and over	
				MALES			
1948	1.3	30.8	64.6	61.2	47.8	42.8	14.7
1949	0.6	30.9	64.0	75.1	35.9	-	14.5
1950	0.7	32.7	58.3	90.3	73.6	42.2	16.1
1951	0.7	38.7	76.7	84.9	63.8	32.9	17.6
1952	1.4	29.0	88.6	129.1	61.2	-	20.2
1953	1.5	36.9	104.6	138.5	112.7	30.8	24.0
1954	0.8	40.2	119.7	151.8	84.2	58.6	25.0
1955	0.9	31.7	117.7	165.7	96.7	85.0	24.9
1956	1.4	35.8	121.9	191.0	139.9	48.1	28.2
1957	1.7	54.0	132.6	193.7	137.5	-	31.0
1958	1.5	49.6	133.1	193.8	149.1	69.4	30.7
1959	1.0	35.0	125.9	223.0	171.5	67.1	29.9
1960	1.3	42.8	124.2	221.0	183.9	218.5	31.4
1961	1.7	52.4	147.0	241.0	184.6	209.2	35.2
1962	1.9	40.8	147.9	300.0	239.0	102.5	37.5
1963	2.2	45.8	173.3	222.7	259.5	226.3	37.4
1964	2.5	50.6	165.0	260.3	234.1	245.8	38.5
1965	1.6	49.4	178.9	307.5	258.3	202.8	41.2
1966	1.4	66.7	194.1	315.1	294.7	159.9	45.2
1967	2.1	50.5	163.5	317.4	327.4	213.3	42.5
1968	1.7	64.7	212.6	365.2	355.3	296.9	51.5
1969	1.9	67.0	186.1	361.4	321.2	108.1	48.3
1970	1.6	56.5	202.7	389.7	353.8	200.7	50.9
				FEMALES			
1948	0.5	3.0	3.6	16.8	4.7	-	2.2
1949	0.3	3.0	2.4	14.7	-	-	1.7
1950	0.1	2.0	12.0	4.7	12.9	31.0	2.1
1951	0.5	2.9	8.3	18.8	12.0	-	3.0
1952	0.1	5.6	11.9	9.2	15.3	23.3	2.8
1953	0.5	5.5	8.2	13.5	18.1	-	3.0
1954	0.4	3.6	10.4	8.9	10.3	-	2.4
1955	0.4	9.6	8.0	19.1	39.3	-	4.3
1956	0.6	10.2	14.7	14.6	21.6	34.1	4.5
1957	0.4	3.3	17.7	17.3	23.9	-	3.9
1958	0.2	6.4	12.0	24.3	31.7	-	4.3
1959	0.7	7.1	11.7	14.2	30.7	-	4.0
1960	1.0	4.6	13.6	26.7	27.1	-	4.8
1961	0.4	13.6	23.8	25.0	23.6	-	6.0
1962	0.4	11.1	17.1	31.5	23.1	26.3	5.7
1963	0.3	9.5	23.3	36.7	15.0	51.2	6.1
1964	0.4	16.6	21.7	38.9	14.8	25.0	6.7
1965	0.5	11.4	23.9	26.3	14.6	47.9	5.8
1966	0.9	16.1	30.6	42.9	31.6	10.7	8.5
1967	0.6	17.2	13.1	42.1	33.6	21.1	7.0
1968	0.6	13.0	37.4	40.0	44.7	10.1	8.8
1969	1.4	18.3	30.7	31.9	39.6	49.8	9.0
1970	0.3	16.8	40.5	45.7	52.8	58.5	10.3

TABLE 6 : DEATHS FROM LUNG CANCER: MAORIS ONLY, NUMBERS AT AGES, 1949-71 A. MALES BY AGE GROUPS

Year	Age groups												All ages
	Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+	
1949	-	-	-	-	-	-	1	-	-	-	-	-	1
1950	-	-	-	-	2	2	-	1	1	-	1	-	7
1951	-	-	-	-	-	-	2	2	-	-	1	-	5
1952	-	1	-	1	-	1	-	3	2	-	-	-	8
1953	-	-	-	-	-	3	1	-	2	1	-	-	7
1954	-	-	-	-	-	2	-	2	2	1	-	2	9
1955	-	-	-	-	1	-	1	3	3	4	-	-	12
1956	-	-	1	-	-	-	2	2	3	1	1	1	11
1957	-	-	-	1	1	-	1	-	3	4	2	-	12
1958	-	-	1	-	-	-	-	1	2	2	2	-	8
1959	1	-	-	-	-	1	-	2	2	4	1	2	13
1960	-	-	-	-	1	3	1	1	2	3	-	3	14
1961	-	-	1	-	1	3	3	4	2	2	1	1	18
1962	-	-	-	-	2	-	2	3	3	2	3	2	17
1963	-	-	-	-	-	2	3	-	5	4	1	3	18
1964	-	-	-	1	-	-	2	2	5	4	1	4	19
1965	-	-	-	-	2	-	1	4	4	6	1	2	20
1966	-	-	-	-	1	2	5	2	5	2	2	5	24
1967	-	-	-	-	-	1	1	2	1	3	3	6	17
1968	-	-	-	-	2	-	3	7	6	7	2	4	31
1969	-	-	-	-	1	2	4	5	3	4	2	5	26
1970	-	-	-	2	2	4	2	5	5	5	2	3	30
1971	-	-	-	-	2	5	2	10	4	9	1	2	35

TABLE 6 : DEATHS FROM LUNG CANCER: MAORIS ONLY, NUMBERS AT AGES, 1949-71 B. FEMALES BY AGE GROUPS

Year	Age groups												All ages
	Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+	
1949	-	-	-	-	-	-	-	1	1	-	-	-	2
1950	-	-	-	-	-	-	-	-	1	-	-	-	1
1951	-	-	-	-	-	-	-	-	-	1	-	-	1
1952	-	-	-	-	-	-	1	1	-	-	-	-	2
1953	-	-	-	-	-	-	1	1	-	-	-	-	2
1954	-	-	-	-	-	1	-	-	1	1	-	-	3
1955	-	-	-	-	-	1	-	-	-	-	-	-	1
1956	-	-	-	1	-	1	-	-	1	2	-	1	6
1957	-	-	-	-	1	1	-	3	2	-	-	-	7
1958	-	-	-	-	-	-	-	-	2	2	-	-	4
1959	-	-	-	-	-	-	-	-	-	1	1	1	3
1960	-	-	-	-	1	-	2	1	2	3	1	1	11
1961	-	-	-	-	-	2	-	-	1	1	1	-	5
1962	-	-	-	-	-	-	-	-	1	1	2	1	5
1963	-	-	-	-	-	-	1	1	2	3	3	2	12
1964	-	-	-	-	-	2	-	-	3	4	-	-	9
1965	-	1	-	1	-	1	4	2	1	1	1	1	13
1966	-	-	-	-	-	-	1	2	1	1	1	-	6
1967	-	-	-	-	-	2	2	3	2	3	2	2	16
1968	-	-	-	-	-	1	1	-	2	2	2	3	11
1969	-	-	-	-	2	-	2	5	2	1	-	1	13
1970	-	-	-	-	-	-	4	2	4	3	1	3	17
1971	-	-	-	-	1	-	2	3	3	1	1	3	14

TABLE 7 : DEATHS FROM LUNG CANCER: MAORIS ONLY, RATES AT AGES, 1949-71

Average annual rates in quinquennia centred on the censuses of 1951, 1956, 1961, 1966 and estimates for 1969/71

Rates per 100,000

5-year period and latest 3-year period	Age groups												All ages
	Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+	
MALES													
1949-53	-	4.7	-	6.4	15.1	58.6	50.3	98.1	104.2	28.9	95.0	-	9.4
1954-58	-	-	10.4	6.0	14.0	14.7	45.6	109.1	265.6	320.4	214.1	113.4	14.8
1959-63	0.4	-	4.0	-	25.4	61.1	75.0	121.2	226.7	367.6	248.4	412.8	18.8
1964-68	-	-	-	3.9	27.0	18.8	94.0	160.4	304.1	441.8	366.6	731.7	21.7
1969-71	-	-	-	12.1	35.6	106.8	94.9	298.6	236.7	560.8	270.3	681.9	26.6
FEMALES													
1949-53	-	-	-	-	-	-	30.7	63.2	50.6	35.1	-	-	2.8
1954-58	-	-	-	5.9	7.3	36.3	-	49.8	150.6	165.3	-	42.4	6.3
1959-63	-	-	-	-	6.6	14.6	31.3	29.4	117.3	276.1	421.1	216.5	8.8
1964-68	-	2.8	-	3.9	-	39.3	66.3	82.2	149.9	261.0	280.4	229.4	11.1
1969-71	-	-	-	-	21.8	-	96.6	164.9	210.9	173.3	111.2	478.6	13.2

TABLE 8 : NEW CASES OF LUNG CANCER REGISTERED, MAORIS ONLY : NUMBERS AT AGES, 1953-70

New cases registered with the National Cancer Registry

A. MALES BY AGE GROUPS

Year	Age groups																		All ages
	0-4	5-9	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60-	65-	70-	75-	80-	85+	
1953	-	-	-	-	-	-	-	-	-	1	-	-	4	1	-	-	-	-	6
1954	-	-	-	-	-	-	-	-	-	2	-	1	1	-	-	-	-	-	4
1955	-	-	-	-	-	-	-	-	1	-	1	1	2	3	-	1	-	-	9
1956	-	-	-	-	-	-	-	-	-	-	2	1	3	1	-	-	-	-	7
1957	-	-	-	-	-	-	-	-	-	-	-	-	3	3	2	-	-	-	8
1958	-	-	-	-	-	-	1	-	-	1	1	3	2	3	-	-	-	-	11
1959	-	-	-	-	-	-	-	-	1	-	1	3	1	3	-	3	-	-	12
1960	-	-	-	-	-	-	1	-	-	4	-	1	2	1	1	1	-	1	12
1961	-	-	-	1	-	-	-	-	-	1	5	4	2	2	3	-	-	-	18
1962	-	-	-	-	-	-	-	-	2	1	2	3	4	8	2	2	-	1	25
1963	-	-	-	-	-	-	-	-	1	-	4	1	4	1	1	1	-	-	13
1964	-	-	-	-	-	-	-	1	1	-	4	4	3	3	1	1	-	-	18
1965	-	-	-	-	-	-	-	-	1	-	2	7	7	3	-	1	-	1	22
1966	-	1	-	-	-	-	-	-	1	3	7	2	7	5	4	1	2	1	34
1967	-	-	-	-	-	-	-	-	1	-	1	4	3	3	2	-	1	3	18
1968	-	-	-	-	-	-	1	-	-	1	6	5	4	2	-	2	-	1	22
1969	-	-	-	-	1	-	-	2	-	3	4	8	8	6	1	2	-	1	36
1970	-	-	-	-	-	-	-	-	3	2	2	4	6	5	-	2	1	-	25

TABLE 8 : NEW CASES OF LUNG CANCER REGISTERED, MAORIS ONLY : NUMBERS AT AGES, 1953-70

New cases registered with the National Cancer Registry

B. FEMALES BY AGE GROUPS

Year	Age groups																	All ages
	0-4	5-9	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60-	65-	70-	75-	80-	85+	
1953	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
1954	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
1955	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	3
1956	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	2	-	1	5
1957	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	3
1958	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	2
1959	-	-	-	-	-	-	-	-	-	1	1	-	-	-	2	1	-	-	5
1960	-	-	-	-	-	-	-	-	1	-	-	1	3	5	1	-	-	-	11
1961	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	3
1962	-	-	-	-	-	-	-	-	-	1	1	-	2	-	3	-	-	-	7
1963	-	-	-	-	-	-	-	-	-	-	1	1	2	2	1	1	-	1	9
1964	-	-	-	-	-	1	-	-	-	3	2	-	3	2	-	-	-	-	11
1965	-	-	-	-	-	-	-	1	-	1	2	4	2	-	-	1	-	-	11
1966	-	-	-	-	-	-	-	-	-	2	5	2	2	3	1	-	-	-	15
1967	-	-	-	-	-	-	-	-	-	-	1	2	-	4	1	3	-	-	11
1968	-	-	-	-	-	-	-	-	1	-	4	3	2	1	2	1	1	-	15
1969	-	-	-	-	-	-	-	-	1	1	1	2	3	-	1	1	-	1	11
1970	-	-	-	-	-	-	-	-	-	-	2	1	2	-	1	1	-	-	7

TABLE 9 ; NEW CASES OF LUNG CANCER REGISTERED, MAORIS ONLY: RATES AT AGES, 1953-70

Cases registered with the National Cancer Registry

Rates per 100,000

Year	Age groups						All ages
	Under 45	45-54	55-64	65-74	75-84	85 and over	
				MALES			
1953	-	25.2	18.0	85.8	-	-	9.4
1954	-	48.5	88.1	-	-	-	6.1
1955	1.7	23.3	128.8	243.9	277.8	-	13.2
1956	-	44.5	163.3	83.3	-	-	9.9
1957	-	-	118.6	414.9	-	-	10.9
1958	1.5	41.5	193.1	247.9	-	-	14.5
1959	1.4	20.1	149.8	244.9	722.9	-	15.3
1960	1.4	78.1	108.3	160.0	238.1	3333.3	14.8
1961	1.3	113.9	206.2	384.6	-	-	21.1
1962	2.5	56.0	228.8	729.9	454.5	1250.0	28.1
1963	1.2	73.4	155.3	142.3	223.2	-	14.1
1964	2.4	72.1	209.0	280.7	221.2	-	18.9
1965	1.1	35.3	405.8	204.8	212.8	2222.2	22.3
1966	2.2	169.5	249.8	590.9	607.3	1960.8	33.0
1967	1.1	17.2	191.8	315.5	232.0	3370.8	16.9
1968	1.0	117.3	236.8	119.8	470.6	1333.3	20.1
1969	3.0	114.2	411.3	413.0	470.6	1666.7	32.0
1970	3.0	64.7	256.4	299.4	697.7	-	22.1
				FEMALES			
1953	-	29.9	-	-	-	-	1.6
1954	-	-	56.2	-	-	-	1.6
1955	-	83.1	-	-	-	-	4.6
1956	-	26.6	49.5	-	579.7	740.7	7.4
1957	-	-	144.9	-	-	-	4.3
1958	-	-	-	199.0	-	-	2.7
1959	-	46.6	-	194.2	307.7	-	6.6
1960	1.4	-	172.4	574.2	-	-	14.0
1961	-	-	42.0	193.2	-	-	3.6
1962	-	41.5	80.3	272.7	-	-	8.1
1963	-	20.0	114.9	267.9	269.5	1123.6	10.1
1964	1.2	96.3	109.9	177.8	-	-	11.9
1965	1.2	56.2	212.8	-	260.4	-	11.5
1966	-	127.5	135.6	311.3	-	-	15.0
1967	-	17.7	64.7	373.1	753.8	-	10.7
1968	1.0	68.1	154.8	210.5	512.8	-	14.1
1969	1.0	33.0	149.3	66.4	259.7	1111.1	10.0
1970	-	32.4	87.7	65.4	263.2	-	6.3

TABLE 10 : ESTIMATED LUNG CANCER INCIDENCE: MAORIS ONLY: NUMBERS AT AGES, 1966-70

Year	Age groups																		All ages
	0-4	5-9	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60-	65-	70-	75-	80-	85+	
MALES																			
1966	-	1	-	-	-	-	-	-	1	4	7	2	7	5	4	1	3	1	36
1967	-	-	-	-	-	-	-	-	1	-	1	4	3	4	2	1	2	3	21
1968	-	-	-	-	-	-	1	-	-	1	7	5	4	4	-	2	-	1	25
1969	-	-	-	-	1	-	-	2	-	3	4	10	8	6	1	2	1	2	40
1970	-	-	-	-	-	-	-	-	3	3	2	5	6	5	1	2	1	-	28
FEMALES																			
1966	-	-	-	-	-	-	-	-	-	2	5	2	2	3	1	-	-	-	15
1967	-	-	-	-	-	-	-	-	-	-	1	2	1	4	1	4	-	-	13
1968	-	-	-	-	-	-	-	-	1	-	5	3	3	1	3	1	1	-	18
1969	-	-	-	-	-	-	-	-	1	1	1	2	3	-	1	2	-	1	12
1970	-	-	-	-	-	-	-	-	-	-	2	2	2	-	1	2	-	-	9
PERSONS																			
1966	-	1	-	-	-	-	-	-	1	6	12	4	9	8	5	1	3	1	51
1967	-	-	-	-	-	-	-	-	1	-	2	6	4	8	3	5	2	3	34
1968	-	-	-	-	-	-	1	-	1	1	12	8	7	5	3	3	1	1	43
1969	-	-	-	-	1	-	-	2	1	4	5	12	11	6	2	4	1	3	52
1970	-	-	-	-	-	-	-	-	3	3	4	7	8	5	2	4	1	-	37

APPENDIX B

H.—M.S. 50

DEPARTMENT OF HEALTH—MEDICAL STATISTICS BRANCH

CANCER STATISTICS

Special Form for Bronchial and Bronchiolar Carcinoma and Adenoma

(To be filled in for all cases of carcinoma of lung or bronchus in addition to Card M.S. 38—4)

Reg. No.

Code No. (Leave blank)

1 – 5 Reg. No.

6 – 10 Surname (in capitals): ..... Christian Names: .....

11 – 13 Address: .....

14 – 17 Occupations: .....
(Record occupation, industry and status.)

18 – 19 Industrial hazards (if any): .....

20 – 22 Name of hospital making initial diagnosis: .....
(For private cases, name of doctor referring case.)

23 – 25 Name of hospital treating case: .....

26 – 27 Date of birth: ..... Age in years: .....

28 Sex (write M or F): .....

29 – 30 Birthplace: .....

31 – 32 Length of residence in New Zealand: .....years. Year arrived in N.Z.: .....

33 Race (write Maori or Non-Maori): .....

34 – 36 **DATE OF FIRST TREATMENT:** Day Month Year

(If no treatment then date of diagnosis) ..... : ..... : .....

Month Year

37 – 39 **DATE OF FIRST SYMPTOMS:** ..... : .....

40 **DURATION OF SYMPTOMS:**

(Interval between onset and first treatment or diagnosis)

No symptoms	0
0– 3 months	1
4– 6 months	2
7–12 months	3
13–24 months	4
Over 24 months	5

41 **SMOKING HABITS:**

Never smoked or only occasionally 0

(1 cigarette or more a day for 1 year constitutes a smoker.)

		Age started smoking	Age stopped smoking
Smokers or ex-smokers			
Light smoker (under 10 per day)	1		
Moderate (10–20 per day)	2		
Heavy (over 20 per day)	3		
Chain smoker	4		
Pipe and/or cigars only	5		

42 **PREVIOUS HISTORY OF CANCER**

No previous history in patient or blood relatives	0
In patient	1
In blood relatives	2
In both patient and blood relatives	3

43 **PRE-EXISTING RESPIRATORY DISEASE:**

None	0
Chronic upper respiratory	1
Chronic bronchitis	2
Pulmonary tuberculosis	3
Bronchiectasis	4
Pneumoconiosis	5
Other.....	6

44 – 45 **MODE OF PRESENTATION:** (Most significant only to be recorded.)

Incidental findings	Medical examination	0
Symptoms	Radiographic	1
Respiratory Symptoms	Cough	2
	Expectoration or altered expectoration	3
	Blood spitting	4
	Wheeze	5
	Chest pain	6
	Hoarseness or aphonia	7
	Shortness of breath	8
General Symptoms	Lassitude	9
	Loss of weight	10
Signs	Pneumonia and/or empyema	11
	Mediastinal obstruction	12
	Lymph node metastases	13
	Distant metastases	14
	Cervical sympathetic involvement	15
	Peripheral neuritis	16
	Other (state).....	17

NOTE—In items 40–45, indicate reply by circling appropriate code number, e.g., Item 41, Chain Smoker (4)

APPENDIX B : SIDE 2

46 **PATHOLOGICAL DATA:** (Classified by most malignant cell type.)
Squamous 1
Small cell undifferentiated 2
Large celled undifferentiated 3
Adenocarcinoma 4
Bronchiolar (alveolar celled) 5
Adenoma—cylindroma 6
carcinoid 7
Other (state)..... 8

47 **SITE:** Central 1
Peripheral 2
Bronchiolar—
Single 3
Multiple 4
Trachea 5

48 **LUNG:** Right 1
Left 2
Both 3

49 **ANATOMICAL SITE:** Central group—
Main bronchus 1
Lobar bronchus—
Upper 2
Lower 3
Middle 4
Lingula 5
Peripheral group—
Lobar site—
Upper 6
Lower 7
Middle 8
Lingula 9

50 **INITIAL RADIOGRAPHIC APPEARANCES:**
Pneumonia consolidation 1
Cavitation 2
Collapse 3
Hilar opacity 4
Peripheral opacity 5
Other (state)..... 6
Multiple opacities 7
Opacity and collapse 8
Normal film 9

51 – 53 **DIAGNOSIS** Day Month Year
Date: ... : ... : ...

BASIS:

54 Cytology ..... Pleural fluid 0
Sputum 1
Bronchial Washings 2
Biopsy ..... Bronchoscopic 3
Needle or aspiration 4
Lymph node 5
Thoracotomy 6
Other ..... Autopsy 7
Clinical non-proven 8

55 **TREATMENT OF PRIMARY SITE ONLY:**
None 0
Palliative ..... Radiation 1
Surgery 2
Other..... 3
Curative ..... Pneumonectomy only 4
Lobectomy only 5
Pneumonectomy or Lobectomy and Radiation 6
Radiation only HVL 7
Radiation only—Super 8
Other..... 9

56 **DIED OF:** Malignant disease 1
Intercurrent without malignant disease 2
Intercurrent with malignant disease 3

57 – 59 Day Month Year
Date of death: ... : ... : ...

60 – 61 **SURVIVAL:** From the onset of first symptoms.....years
From diagnosis or first treatment.....years

62 **METASTASES TO:** (At time of diagnosis)
None 0
Lymph nodes intrapulmonary 1
Lymph nodes extrathoracic 2
Mediastinal lymph nodes 3
Chest wall 4
Other mediastinum-specify 5
Brain 6
Bone 7
Liver 8
Other organ or tissue 9
Multiple metastases 10

PULMONARY METASTASES

63 **SPREAD:** Solitary 1
Multiple 2
Miliary 3

64 **PRIMARY SITE:** Breast 1
Stomach 2
Bowel 3
Kidney 4
Other (state)..... 5
From lung 6

65 – 66 **HISTOLOGICAL TYPE** (state).....

67 **TREATMENT:** None **0**; Palliative only **1**; Lobectomy **2**; Pneumonectomy **3**;
Other **4**.....

68 **OTHER THORACIC TUMOURS:** Chest wall **1**; Mediastinum **2**; Diaphragm **3**

69 **TREATMENT OF OTHER METASTASES** ..... **1** Yes
2 No

NOTE—In items 46-69, indicate reply by circling appropriate code number, e.g., Item 47, Site Central ①

3,000/9/63—76600 W

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